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## Rice Productivity In Bayalangu Kidul Village

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### Abstract

#### **Keywords:**

Rice;  
Productivity;  
Farmer

The problem raised in this study is the decline in rice productivity. This study aimed to analyze the influence of age, education, farming experience, irrigation, activeness of farmer groups, seeds, technology and agricultural extension on rice productivity in Bayalangu Kidul Village, Gegesik District, Cirebon Regency. This study used primary data with total sample of 77 rice farmers. The method of multiple linear regressions was used in this study by processing data using evIEWS software. The results of the study showed that education, farming experience, irrigation, the activeness of farmer groups, seeds, and the intensity of the introduction had a positive and significant effect on rice productivity. Age and technology variables have a positive and insignificant effect on rice productivity. This finding implies that the need for the performance of local and central government in increasing rice production and farmers are expected to increase knowledge in rice farming.

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### INTRODUCTION

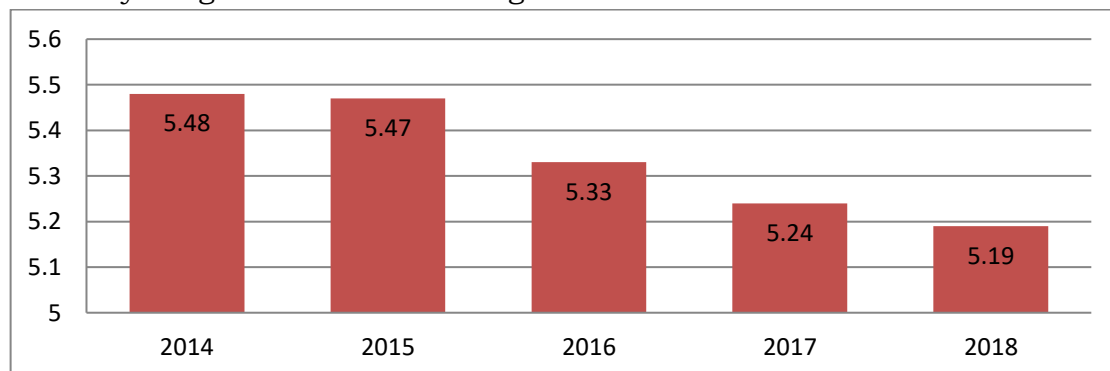
As a leading commodity in the agricultural sector, rice production should be the main focus of each region to maintain food security. The increase in rice production in each region results in the raise of national rice production. The increased importance of rice production cannot be separated from the population growth of 1.9 percent (Mahmud et al. (2010). This is supported by the research done

by Riyanto et al. (2013), stated that rice is the main food commodities in Indonesia. 95 percent of the population in Indonesia relies on rice as staples. Consequently, the demand for rice in Indonesia continues to increase with growing number of the population.

To increase rice productivity, agricultural innovation is needed. However, some empirical studies show that agricultural extension has a significant and not significant effect on rice productivity. Research by Altarawneh *et al.* (2012) showed that in increasing rice productivity in Jordan, increase in food security, agricultural counseling is needed. However, the fact is that agricultural instructors fail to accompany farmers to adopt new technologies and innovations in agriculture. Azril *et al.* (2010) stated that the role of agricultural extension in directing farmers in the process of rice production is required to increase the rice production in Malaysia. In addition, the research of Chaudhry *et al.* (2016) stated that in the development of a sustainable agriculture sector in Pakistan in increasing agricultural productivity requires active involvement between research centers and private sector organizations and agricultural organizations and agricultural extension management.

In addition, Basnet's empirical study (2008) stated that to increase rice production capacity in the summer, the Nepalese government varied 41 superior seeds. Basavaraja *et al.* (2008) explained that to improve rice productivity in Andhra Pradesh, quality seeds are needed. Research from Refqi et al (2017) explained that subsidized seed can increase farmer productivity and income. However, research from Kariyasa (2007) argued that the policy of seed subsidies through seed producers has been less effective. It can be seen from the fact that there are still many farmers who have not used the labeled seeds because the price is relatively expensive and the quality of seeds produced by producers is not as expected.

The effort made by the Cirebon Regency local government through its agriculture service to increase rice production is to pay special attention to the agricultural sector, especially rice. Besides, Cirebon Regency has quite good potential in increasing rice production capacity, viewed from the area of land which is mostly used for agricultural land. Based on data from the Cirebon District Agriculture Office, it was noted that the total area of 52,725 hectares of agricultural land spread over 40 districts. Gegesik district is a district with the largest agricultural land in Cirebon Regency with an area of 5,223 hectares. However, the level of productivity of agricultural land has decreased if seen from the last 5 years. Figure 1 shows the productivity of agricultural land in Gegesik District in 2018.



**Figure 1. Rice Productivity at Gegesik District in 2018 (Ton / Ha)**

Source: Cirebon Regency Statistic Agency, 2018

The decline in rice productivity in Gegesik District needs to be analyzed further. Rice is a staple food and needs to be improved for community food security. Gegesik Subdistrict consists of 14 villages with different agricultural land areas. The village with the largest rice farming area, Bayalangu Kidul, has an area of 564 hectares. Therefore the village was chosen as the location of the study.

Factors that influence rice productivity include age, education in farming experience, irrigation, activeness of farmer groups, seeds, technology and agricultural extension. Soekartawi (1999) explained that the age of farmers has a correlation with productivity. Younger farmers have the potential to work more optimally when compared to old age. Thus, young farmers do not experience too much obstacles in the process of increasing the rice production (Bahasoan, 2013). This is supported by Suwanto (2018), Shaikh et al. (2016), and Sujaya et al. (2018) which stated that the age of farmers influences productivity in the agricultural sector.

Kusnadi et al. (2011) explained that farmers' higher education would be more open in receiving information and easier to adopt new technologies in agriculture. Suwanto (2008), Osanyinlusi et al. (2016), Oktavia (2017), Hoar & Fallo (2017), and Sujaya et al. (2018) explained that the education level of farmers had a positive and significant effect on farm productivity. In addition, according to Soekartawi (1999) innovations owned by farmers can be used to increase rice productivity. The innovation was obtained through farming experience. farmers who have a longer experience are easier to implement and get innovation when compared with farmers who are just pioneering experience. Araujo & Nubatonis (2016) and Sujaya et al. (2018) described that farming experience has a positive and significant influence on the production of lowland rice farming.

Irrigation also plays an important role in increasing rice production. According to Muzdalifah (2014) and Sutrisna et al. (2017) concerning the effect of irrigation on the productivity of lowland rice farming, the irrigation variable has a positive and significant effect. The provision of irrigation can support the growth of rice, because in the dry season the availability of rice will decrease. To increase the productivity of agricultural land, group support is needed through the activity of farmers. To increase the activeness of farmer groups, regular and regular meetings are needed to discuss planning, discussion, decision making and implementation of work plans, finding and disseminating information, increasing farming activities, and so on (Harisman, 2014). Described in Nasution's research (2019) farmer groups have a large role in increasing rice productivity.

According to Widowati (2007) quality seeds used by rice farmers increase effectiveness and efficiency. This is due to the number of plants that will grow better, thereby increasing rice production. By providing good quality seeds and good planting methods, it will impact on the output produced, so that productivity will increase. Research Pasaribu et al. (2015) explained that seeds have a positive effect on the productivity of lowland rice. In addition, according to Andriani & Lubis (2018) explained that the application of cultivation technology to the productivity of rice farming had a positive and significant effect. The use of technology will have an impact on the level of efficiency and productivity. The use of technology such as

tractors and rice harvesting machines will certainly have an impact on the time used and the output produced (Arimbawa & Widanta (2017).

In addition to the use of technology, the role of agricultural extension workers is also important. Asnawi et al. (2017) showed that agricultural extension is urgently needed for farmers. In his findings, counseling had a positive impact on productivity. The more often farmers participate in counseling about agricultural crops, the greater the opportunity to increase production. Harnalius et al. (2018) also argued that the effect of counseling on the productivity level of lowland rice is positive because it has an impact on changes in farmer's behavior.

The novelty of this research is to penetrate the seed variables and the intensity of agricultural extension. Some of the seeds planted by farmers are subsidies from the government, and it has to be known whether the seed from the government can increase rice productivity or not. Thus this study aimed to 1) analyze the influence of farmers' age on rice productivity, 2) analyze the effect of farmers' education on rice productivity, 3) analyze the effect of farming experience on rice productivity, 4) analyze the effect of irrigation on rice productivity, 5) analyze the effect of farmer groups' activeness on rice productivity, 6) analyzing the effect of seeds on rice productivity, 7) analyzing the influence of technology on rice productivity, and 8) analyzing the effect of extension intensity on rice productivity in Bayalangu Kidul Village, Gegesik District, Cirebon Regency.

## RESEARCH METHODS

This research is a case study supported by primary data analysis which aimed to determine whether there is a pattern of relationships between two or more variables (Sugiyono, 2015). This research was conducted in March 2020 in the Bayalangu Kidul Village, Gegesik District, Cirebon Regency. The populations used were 319 rice farmers. Slovin formula was used in determining the number of samples (in Umar, 2004). The study used samples of 77 rice farmers as respondents. Sampling from respondents was chosen randomly from the number of respondents of rice farmers. The dependent variables in this study were: rice productivity measured in quintal units per hectare. The independent variable in this study was productivity measured in units of quintal per hectare. Meanwhile the independent variables were the age of farmers measured in unit of years, education of farmers measured in unit of years, farming experience measured in years, irrigation as measured by dummy unit (1 = irrigation and 0 = not irrigation), the activeness of farmer groups measured in time unit, seeds measured in dummy unit (1 = subsidized seed and 0 = non-subsidized seeds), and technology measured in dummy unit (1 = Tractor and 0 = Traditional)

To analyze the magnitude of the influence of independent variables (farmer's age, education, farming experience, irrigation, land area, farmers' activeness, seeds, technology, and intensity of counseling on rice productivity in Bayalangu Kidul Village, Gegesik District, Cirebon Regency, this study used multiple linear regression models (Multiple Linear Regression Method) with Ordinary least Square (OLS) method (Gujarati & Porter, 2012), namely:

$$P = \beta_0 + \beta_1 UP_i + \beta_2 PDDK_i + \beta_3 PUT_i + \beta_4 DIR_i + \beta_5 K_i + \beta_6 B_i + \beta_7 DT_i + \beta_8 IP_i + e_i$$

Information:

$\beta_0$  : The amount of productivity when the independent variable is zero

- $\beta_1$  : The magnitude of the effect of the age of the farmer on productivity  
 $\beta_2$  : The magnitude of the effect of education on productivity  
 $\beta_3$  : The magnitude of the effect of experience on productivity  
 $\beta_4$  : The magnitude of the influence of irrigation on productivity  
 $\beta_5$  : The magnitude of the effect of activeness on productivity  
 $\beta_6$  : The magnitude of the effect of seeds on productivity  
 $\beta_7$  : The magnitude of the effect of technology on productivity  
 $\beta_8$  : The magnitude of the effect of counseling on productivity  
UP : Age of farmer (year)  
PDDK : Education (Year)  
PUT : Farming experience (years)  
DIR : Dummy Irrigation (1 = irrigation and 0 = no irrigation)  
K : Activeness (Times)  
B : Seed (1 = subsidized seed and 0 = non-subsidized seed).  
DT : Dummy Technology (1 = Tractor and 0 = Traditional)  
IP : intensity of illumination (times)  
 $e$  : Standard error.  
 $i$  : Cross section

According to Gujarati & Porter (2008) the regression results must have the *Best Linear Unlimited Estimator* criteria. To get these criteria, the regression must pass the classical assumption test phase consisting of tests of normality, multicollinearity, and heteroscedasticity.

## RESULT AND DISCUSSION

### Results of Analysis of the Influence of Farmer Age, Education, Farming Business Experience, Irrigation, Activities, Seed, Technology, and Intensity of Rice Productivity Counseling

Before further discussion regarding the output of regression, this study has been declared to have passed the classical assumptions which included tests of normality, multicollinearity, and heteroscedasticity. Thus, this regression output has been named the Best Linear Unlimited Estimator (BLUE), so that this regression output can be used. In testing the significance of the effect of independent variables (age of farmers, education, farming experience, irrigation, activity, seeds, technology, and extension intensity) on the dependent variable (productivity), this study used multiple regression analysis. The regression output in this study used Eviews software, and can be seen in table 1 as follows.

**Table 1. Multiple Linear Regression Outputs**

No.	Independent Variable	Regression Coefficient	t count	t table	Information
1	Farmer Age	0.041	1,141	< 1,996	Not significant
2	Education	0.271	2,880	> 1,996	Significant
3	Farming experience	0.062	2,004	> 1,996	significant
4	Irrigation	0.818	2,196	> 1,996	Significant
5	Liveliness	0.262	2,010	> 1,996	Significant
6	Seed	.753	2,131	> 1,996	Significant
7	Technology	.241	0.501	< 1,996	Not significant
8	Intensity of Counseling	.458	2,071	> 1,996	Significant
Constants = 52,753					
Adjusted R <sup>2</sup> = 0.505					

Source: Regression Output

Seen from Table 1, the variables of education, farming experience, irrigation, activity, seeds, and extension intensity significantly influence rice productivity in Bayalangu Kidul Village, Gegesik District, Cirebon Regency. Meanwhile, the age variable of farmers and technology has no significant effect on rice productivity in the Bayalangu Kidul Village, Gegesik District, Cirebon Regency.

### **Effect of Farmer Age on Rice Productivity**

Farmers' age has a regression coefficient of 0.041 and the value of t-count (1.141) is smaller than t-table (1.996). This shows that the age of the farmers has a positive and not significant effect on rice productivity in Bayalangu Kidul Village. These results are not in line with the findings of Suwanto (2018), Shaikh et al. (2016), and Sujaya et al. (2018) who found that the age of farmers affected the productivity in the agriculture sector. From the sample used in this study, the average age of farmers is already in the non-productive age, so they tend to be very conservative in responding to changes or technological innovations. Unlike the case with young farmers who can affect the performance of farmers in farming, younger farmers have the potential to work more optimally when compared to old age. Thus, in the process of increasing rice production capacity, young farmers do not experience many obstacles (Bahasoan, 2013).

### **Effects of Education on Rice Productivity**

Farmer education has a regression coefficient of 0.271 and the value of t-count (2.880) is greater than t-table (1.996). This shows that farmer education has a positive and significant effect on rice productivity in Bayalangu Kidul Village. The majority of rice farmers in the Bayalangu Kidul Village have middle school education. This indicates that the education of farmers is quite good when compared to the education of farmers who only went to elementary school or never attended any school. According to Kusnadi et al. (2011), farmers' higher education would make them more open in accepting information and easier to adopt new technologies in agriculture. The better the education of farmers, the ability in management and mastery of technology will be better, so the efficiency will be increased. This study is in line with Suwanto (2008), Sjakir et al. (2015), Osanyinlusi et al. (2016), Oktavia (2017), Hoar & Fallo (2017), and Sujaya et al. (2018) explained the level of education possessed by farmers had a positive and significant effect on farm productivity.

### **Effect of Farming Business Experience on Rice Productivity**

The experience of farming has a regression coefficient of 0.062 and the value of t-count (2.004) is greater than t-table (1.996). This shows that the experience of farmers has a positive and significant effect on rice productivity in Bayalangu Kidul Village, Gegesik District, Cirebon Regency. The average immersion in rice farming in the Bayalangu Kidul Village is 18.38 years. This indicates that farmers already have quite a long experience; therefore the farmers already have many years of knowledge in increasing their rice production capacity. In addition, according to Soekartawi (1999), innovations owned by farmers can be used to increase rice production. The innovation was obtained through farming experience. Farmers who have longer experience will find it easier to apply and acquire innovation compared to farmers who are just pioneering experience. This study is in line with Sjakir et al. (2015) and Araujo & Nubatonis (2016) which state that farming experience has a positive and significant influence on the

production of lowland rice farming. This means that the more farm experience, the easier it will be for them to take actions and decisions in the process of rice production, so that both rice production and productivity will increase. This is supported by the findings of Sujaya et al. (2018) which explained that farming experience owned by farmers has a positive and significant correlation to agricultural productivity.

### **Effect of Irrigation on Rice Productivity**

Irrigation has a regression coefficient of 0.818 and the value of t-count (2.196) is greater than t-table (1.996). This shows that irrigation has a positive and significant effect on rice productivity in Bayalangu Kidul Village. From 70 total samples, 12 rice farmers have received irrigation from the available reservoirs. This shows that the availability of reservoirs for rice irrigation shows satisfactory results because rice productivity can be increased. Irrigation is a vital element in supporting rice production, because rice plants must get sufficient water in their planting systems. According to Muzdalifah (2014), the effect of irrigation on the productivity of rice farming is very important because the provision of irrigation will be able to sustain the growth of rice, especially during the dry season when rice availability decreases. Meanwhile, Floch & Molle, (2009) and Sutrisna et al. (2017) explained the availability of reservoirs for irrigation of agricultural land will be able to maintain productivity and even be able to increase it.

### **Influence of Farmers' Activities on Rice Productivity**

The activeness of farmers in the group has a regression coefficient of 0.262 and the value of t-count (2.010) is greater than t-table (1.996). This shows that the activeness of farmers in farmer groups has a positive and significant effect on rice productivity in Bayalangu Kidul Village. This finding is supported by research by Sjakir et al. (2015), Sunartomo (2016), Sapar (2017) and Suwanto (2018), which showed that the activeness of farmer groups has a positive correlation with agricultural productivity. Agricultural land productivity needs to be supported by farmer groups that can be measured from the activity of farmers in farmer group activities. To increase the activeness of farmer groups, it is necessary to have regular meetings between farmers to discuss planning, discussion, decision making and implementation of work plans, seek and disseminate information, and improve farming, etc. (Harisman, 2014). According to Nasution (2019) farmer groups have a large role in increasing rice productivity. Increased production is influenced by group cooperation, group activity, the status of the chairman and members, and planning management that increases farming activities

### **Influence of Seed on Rice Productivity**

Seed has a regression coefficient of 0.753 and the t-value (2.131) is greater than t-table (1.996). This shows that the seeds have a positive and significant effect on rice productivity in Bayalangu Kidul Village, Gegesik District, Cirebon Regency. The seeds in this study used a dummy variable indicator where the value of 1 indicates seed subsidies from the government. Thus it can be said that the subsidized seed from the government has superior varieties because it can increase rice productivity. According to Widowati (2007), quality seeds used by rice farmers increase effectiveness and efficiency. This causes the plant to grow better and have an impact on more rice production. By giving good quality seeds and good planting methods, it will have an



impact on the output produced; therefore, productivity will increase. This finding is in line with Basavaraja et al. (2008) and Pasaribu et al. (2015) which explained that seeds have a positive effect on the productivity of lowland rice.

### **Influence of Technology on Rice Productivity**

Technology has a regression coefficient of 0.241 and the value of t-count (0.071) which is smaller than t-table (1.996). This shows that technology has a positive but not significant effect on rice productivity in Bayalangu Kidul Village, Gegesik District, Cirebon Regency. This finding is not in line with Sjakir et al. (2015), Arimbawa & Widanta (2017) and Andriani & Lubis (2018) which stated that the application of technology had a positive and significant effect on the productivity of rice farming. In this study the use of technology is only in the processing of agricultural land by tractors. The use of a tractor only affects for the faster and more efficient processing time of land than the traditional method of using buffalo to cultivate paddy land in order to prepare for planting. Thus the use of a tractor has no effect on rice productivity.

### **Effect of Counseling Intensity on Rice Productivity**

The intensity of counseling has a regression coefficient of 0.458 and the value of t-count (2.071) is greater than t-table (1.996). This shows that the intensity of counseling has a positive and significant effect on rice productivity in Bayalangu Kidul Village, Gegesik District, Cirebon Regency. The condition of the sample taken showed that rice farmers in Bayalangu Kidul Village have participated in counseling from the related department with the intensity of at least 1 time and at most 4 times in one rice planting season. Harnalius et al. (2018) and Asnawi et al. (2017) stated that counseling has a positive impact on productivity. With the counseling on rice farming, farmers will have better understanding in farming and good governance of rice cultivation, so that in the end it will have an impact on increased rice production. The more often farmers take part in counseling about agriculture, the greater the opportunity to increase production. However, this study is not in line with Altarawneh et al. (2012) where the influence of agricultural extension was positive but not significant. That was due to the failure of extension workers in accompanying farmers to be able to adopt new technologies and innovations in agriculture.

### **CONCLUSION**

The problem raised in this study is the decline in rice productivity in Bayalangu Kidul Village, Gegesik District, Cirebon Regency. To increase rice productivity in Bayalangu Village, it is necessary to improve the quality of farmers' education, farming experience, irrigation, activeness in farmer groups, seeds, and counseling. In addition, viewed from the theory of production, the active roles of the government along with the input from the farmers are needed to increase the output of rice productivity.

### **RECOMMENDATION**

Based on the results of this study, the government is expected to improve its performance in the agricultural sector in order to increase rice production in Bayalangu Kidul Village, Gegesik District, Cirebon Regency, such as increasing irrigation development, large-scale seed subsidies; meaning that all farmers are given

seed subsidies either free of charge or at a price discount seeds, and increasing the number of extension workers and the intensity of counseling. In addition, farmers are expected to be able to increase activity in farmer groups to further deepen their knowledge in rice farming.

For further research analyzing rice productivity, it is suggested to develop the use of independent variables or analytical methods that are more accurate and credible.

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