INNSPUB

International Journal of Biosciences | IJB |
ISSN: 2220-6655 (Print) 2222-5234 (Online)
http://www.innspub.net
Vol. 23, No. 2, p. 201-210, 2023

RESEARCH PAPER OPEN ACCESS

The effect of agricultural infrastructure assistance and subsidised fertilisers from the Ministry of Agriculture on Rice production in South Kalimantan Province

Akhmad Syahid Berny*, Sadik Ikhsan, Yusuf Azis

Master Study Program of Agricultural Economy, Agriculture Faculty, Lambung Mangkurat University, Banjarbaru, South Kalimantan Province, Indonesia

Key words: Agricultural infrastructure assistance, Subsidised fertiliser, Rice production, Panel data regression, South Kalimantan

http://dx.doi.org/10.12692/ijb/23.2.201-210 Article published on August 06, 2023

Abstract

South Kalimantan Province is the 12th rice producing province in Indonesia and has the 8th largest Rice Field Area (LBS) in Indonesia; this puts South Kalimantan Province as a province that has potential in the agricultural sector, especially food crops. The Ministry of Agriculture through the Directorate General of Agricultural Infrastructure and Facilities allocates a budget for the development of agricultural infrastructure and facilities and subsidised fertilisers every year in order to increase food crop production, especially rice. This study aims to see the effect of agricultural infrastructure and facilities assistance and subsidised fertilisers that have been realised by the Ministry of Agriculture in South Kalimantan Province within a period of 10 years, namely 2012-2021 to increase rice production in 11 districts/cities in South Kalimantan Province and the problems that occur in the distribution of agricultural infrastructure and facilities assistance and subsidised fertilisers. The data analysed are secondary data including rice production data as the dependent variable and the independent variables are irrigation water management activities for agriculture, land expansion and protection activities, agricultural machinery assistance, non-organic subsidised fertiliser and organic subsidised fertiliser. The method of analysis used in this study is the Panel Data Regression Method, which is a combination of time series and cross section data. The results showed that irrigation water management activities for agriculture and non-organic fertilizers had a significant effect on rice production in South Kalimantan Province, then agricultural irrigation water management assistance; agricultural land expansion and protection assistance, agricultural tools and machinery assistance, non-organic subsidized fertilizers and organic subsidized fertilizers simultaneously or thoroughly affect rice production in South Kalimantan Province. The problem faced is the lack of awareness of aid recipients in managing and maintaining the assistance that has been given and the lack of proposals for the realisation of subsidised organic fertiliser in South Kalimantan province.

* **Corresponding Author:** Akhmad Syahid Berny ✉ bernybean@gmail.com

Introduction

Agriculture is an important sector in economic development, given its function and role in providing food for the population, feed and energy, as well as the livelihood of the rural population. This sector has a significant contribution in the formation of Gross Domestic Product (GDP), increasing foreign exchange and improving the welfare of farmers, so that agricultural development can be said to be the driving force and buffer of the national/regional economy.

The Ministry of Agriculture through the Directorate General of Agricultural Infrastructure and Facilities during the period 2012-2021 continues to provide various kinds of infrastructure and facilities assistance, especially in physical building activities which aim to increase the production and productivity of food crops and horticulture, especially rice. The programs implemented are irrigation water management assistance for agriculture through rehabilitation of tertiary irrigation networks, agricultural reservoirs and pumping irrigation, swamp land optimisation assistance, agricultural tools and machinery assistance and subsidised fertiliser assistance. The agricultural infrastructure development assistance program and subsidised fertilisers during the period 2012-2021 implemented by the Ministry of Agriculture in Kalimantan Province should have had an impact and influence in increasing rice production and productivity in South Kalimantan Province which is the 12th province out of 34 provinces capable of producing rice in Indonesia.

The problems that will be discussed in this study are How much influence does the assistance of agricultural infrastructure and subsidised fertilisers budgeted by the Ministry of Agriculture have on increasing rice production in South Kalimantan during 2012-2021 and what problems are faced in the distribution of agricultural infrastructure assistance in South Kalimantan Province.

Material and methods

In this study, the data studied by the author are secondary data that are times series during 2012-2021. The data include, among others, the amount of realisation of funds for agricultural infrastructure and facilities activities, namely; irrigation water management for agriculture, expansion and protection of agricultural land, agricultural equipment and machinery assistance and subsidised fertilisers in 11 districts that contribute to rice production in South Kalimantan Province, in addition to Banjarmasin City and Banjarbaru City.

This method used in this research is to use descriptive and quantitative methods. Descriptive analysis was conducted to determine the general description of the development of subsidised agricultural infrastructure and fertiliser assistance from the Directorate General of Agricultural Infrastructure and Facilities of the Ministry of Agriculture in South Kalimantan Province from 2012 to 2021. Quantitative methods are carried out to analyse problems that are manifested with certain values. The data analysis tool in this study uses the panel data regression method.

The first step is to estimate the combined panel data regression of cross section data and time series data for rice production as follows:

$$Y_{it} = \alpha_0 + \alpha_1 X1_{i,t-1} + \alpha_2 X2_{i,t-1} + \alpha_3 X3_{i,t-1} + \alpha_4 X4_{i,t} + \alpha_5 X5_{i,t} + \mu_{it-1} \dots\dots\dots (1)$$

Description:

Y : total rice production (tonnes)

X_1 : funds for irrigation water management activities for agriculture (Rp)

X_2 : funds for land expansion and protection activities (Rp)

X_3 : funds for agricultural tools and machinery (Rp)

X_4: realisation of subsidised non-organic fertiliser (tonnes)

X_5: realisation of subsidised organic fertiliser (tonnes)

α_0 : constant of equation 1

α_1- α_2 : regression coefficient

μ_(i,t) : error component at time t for unit cross-section i

The dependent variable in this study is Rice Production in tonnes, while the independent variables in this study are the realisation of irrigation water management funds for agriculture, the realisation of agricultural land expansion and protection funds, the amount of agricultural equipment and machinery assistance, the amount of non-organic subsidised fertiliser realisation and the amount of organic subsidised fertiliser realisation so that there are 5 independent variables. According to Widarjono (2009), to estimate model parameters with panel data, there are three model techniques, namely:

1. Common Effect Model
2. Fixed Effect Model
3. Random Effect Model

In order to further confirm the best estimation model, the following testing procedure is carried out:

1. Conducting F Statistical Test (Chow Test)

The Chow test is conducted to select the best estimation method that can be used between Common Effect and Fixed Effect. The hypotheses in this study are:

H_0 = *Common Effect*

H_1 = *Fixed Effect*

If the chi-square probability value < 0.05 then the method used is Fixed Effect, meaning H_0 is rejected, while if the chi-square probability> 0.05 then the method used is Common Effect, which means H_0 cannot be rejected.

2. Performing the Hausman Test

The Hausman test will show the estimation method that can be used between Fixed Effect and Random Effect. The hypotheses in this study are:

H_0 = *Random Effect*

H_1 = *Fixed Effect*

If the chi-square probability value <0.05 then the method used is Fixed Effect or H_0 is rejected. Meanwhile, if the chi square probability> 0.05 then the method used is Random Effect, H_0 cannot be rejected.

3. Performing the Lagrange Multiplier Test

The LM test can be seen in the Chi-Squares distribution with degrees of freedom (df) equal to the number of independent variables. The null hypothesis is that the appropriate model for panel data regression is Common Effect, and the alternative hypothesis is that the appropriate model for panel data regression is Random Effect.

The next step is to carry out assumption and model fit testing which consists of:

1. Normality
2. Multicollinearity
3. Heteroscedasticity
4. Autocorrelation

According to Nachrowi (2006), hypothesis testing is useful for testing the significance of the regression coefficient obtained. This means that the regression coefficient obtained is statistically not equal to zero, because if it is equal to zero, it can be said that there is not enough evidence to state that the independent variable has an influence on the dependent variable. For this purpose, all regression coefficients must be tested. There are two types of hypothesis tests on regression coefficients that can be carried out, namely:

1. F-test

The F-test is intended to test the hypothesis of the regression coefficient (slope) simultaneously...

2. t-test

The t-test is used to test the regression coefficient individually.

3. Test Coefficient of Determination (Goodness of Fit)

Is an important measure in regression, because it can inform whether the estimated regression model is good or not. The coefficient of determination reflects how much variation in the dependent variable can be explained by the independent variable.

Results and discussion

Rice Production Figs in South Kalimantan Province in 2012-2021

Rice production data in South Kalimantan Province for 10 years in 11 districts in South Kalimantan Province based on data from the Food Crops and Horticulture Office of South Kalimantan Province from calculations and Strengthening Strategic Food Data during 2012-2021 in Table 1:

Based on Table 1 in 11 regencies/cities in South Kalimantan Province, Barito Kuala Regency, Tapin Regency and Banjar Regency are the largest regencies in producing rice during the period 2012-2021.

Table 1. Rice production figures in South Kalimantan Province (2012-2021).

No	District/City	Production (Tonnes)									
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
1	Tanah Laut	157.741	168.478	159.386	172.356	201.263	208.928	205.039	252.141	222.139	125.501
2	Kotabaru	74,675	71.015	79.060	80.617	90.954	107.286	76.841	66.383	32.946	37.546
3	Banjar	284.829	285.755	263.941	261.259	277.869	250.387	231.809	209.119	293.475	245.546
4	Barito Kuala	365.627	352.412	338.716	340.395	334.345	389.757	369.760	322.185	406,656	381.446
5	Tapin	286.488	283.907	287.450	301.122	339.504	365.313	343.897	345.268	352.698	349,443
6	Hulu Sungai Selatan	228.328	210.225	219.159	232.950	260.886	253.653	262.365	191.256	161.693	157.394
7	Hulu Sungai Tengah	202.371	218.281	222.204	252.679	286.617	328.611	300.073	231.656	186.360	183.865
8	Hulu Sungai Utara	127,448	53.870	129.588	144.624	130.835	131.787	144.799	143.403	105.066	86.558
9	Tabalong	155.591	152.773	150,694	87.858	109.461	128.019	171.038	169.216	100.956	83.731
10	Tanah Bumbu	74,541	97.377	99.385	97.087	97,660	123.262	140.705	98.585	86,460	75.833
11	Balangan	115,650	124,161	133.081	157.327	171.901	151.580	172.283	171.034	173.760	124.891
South Kalimantan		2.073.289	2.018.255	2,082,664	2.128.275	2.301.295	2.438.584	2.418.609	2.200.247	2.122.207	1.851.754

Source: Data processing, 2023

Realisation of Irrigation Water Management Activities for Agriculture in 2011-2020

This activity is implemented through a menu of activities for rehabilitation of tertiary irrigation networks, rehabilitation of swamp irrigation, agricultural reservoirs and pumping irrigation. Table 2 realisation of water management activities in 2011-2020 in South Kalimantan Province. Based on Table 2, during the period 2011-2020, the largest allocation of agricultural irrigation water management activities occurred in 2015. This is because in 2015 the Ministry of Agriculture created the Special Efforts Rice, Corn and Soybean in name Pajale programme. One of the objectives of irrigation water management activities for agriculture is to ensure the supply of water in rice fields.

Realisation of Land Expansion and Protection Activities in 2011-2020

Land expansion and protection activities are carried out through the menu of land optimization and paddy field printing activities. Land expansion and protection activities are also collected from 2011-2020 because the impact of rice production and productivity will be seen after the current year.

The following Table 3 shows the realisation of land expansion and protection activities in South Kalimantan Province from 2011-2020 through the budg*et al*location of the Assistance Task (TP) of the South Kalimantan State Budget.

Table 2. Realisation of irrigation water management activities for agriculture (2011-2020).

No	District/City	Amount (Million IDR)									
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1	Tanah Laut	1.432	1.720	1.500	650	4.113	660	160	1.558	643	1.018
2	Kotabaru	1.777	1.240	1.680	1.520	6.375	620	498	1.018	778	762
3	Banjar	2.427	1.650	1.680	-	10.981	560	240	478	-	-
4	Barito Kuala	1.610	1.550	2.800	235	2.156	160	-	238	119	357
5	Tapin	1.482	1.540	200	350	3.813	1.760	338	457	-	405
6	Hulu Sungai Selata	887	1.900	500	500	4.500	1.770	160	357	119	1.001
7	Hulu Sungai Tenga	712	1.460	2.500	1.120	8.834	660	738	441	898	897
8	Hulu Sungai Utara	110	1.680	500	620	1.188	360	2.078	238	238	238
9	Tabalong	617	1.480	1.500	120	6.250	1.840	578	478	831	1.152
10	Tanah Bumbu	792	1.000	1.100	-	1.398	160	443	478	-	508
11	Balangan	617	1.180	1.500	300	1.375	160	498	373	473	-
South Kalimantan		12.463	16.400	15.460	5.415	50.981	8.710	5.728	6.113	4.098	6.338

Source: Data Processing (2023)

Table 3. Realisation of agricultural land expansion and protection activities (2011-2020).

No	City/District	Amount (million IDR)									
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1	Tanah Laut	400	6.69	5.888	815	1.418	11.25	4.502	7.856	63.418	-
2	Kotabaru	6.2	10.02	5.695	6.695	4.2	15.759	4.479	-	-	-
3	Banjar	-	6.69	1.238	-	284	1.965	2.904	3.264	84.118	-
4	Barito Kuala	-	3.13	4.04	3.56	4.982	4	1.2	9.203	178.799	30.441
5	Tapin	1.625	3.56	1.038	1.1	5.283	5.334	446	-	7.483	-
6	Hulu Sungai Selata	490	2.67	1.038	1.848	6.264	8.999	8.85	280	1.62	785
7	Hulu Sungai Tenga	400	2.24	1.038	1.025	5.76	-	-	1.62	7.927	-
8	Hulu Sungai Utara	-	2.24	623	513	-	2.946	900	1.401	2.237	-
9	Tabalong	4.2	15.59	3.651	1.025	2.4	6.754	2.654	-	9.993	-
10	Tanah Bumbu	5.335	1.12	6.378	-	3.616	1.22	1.012	-	-	-
11	Balangan	3.225	2.24	4.233	3.805	4.104	897	1.838	-	3.494	-
South Kalimantan		21.875	56.19	34.856	20.385	38.31	59.124	28.785	23.625	359.087	31.226

Source: Data Processing (2023)

Based on Table 3, during the period 2011-2020, the largest allocation of land expansion and protection activities occurred in 2019. This is because in 2019 the Ministry of Agriculture created the Selamatkan Rawa Sejahterakan Petani (Serasi) programme.

Realisation of Agricultural Equipment and Machinery Assistance Activities in 2011-2020

Agricultural tools and machinery assistance activities are carried out through the procurement of pre-harvest agricultural tools and machinery, namely 2-wheeled tractors (plough and rotary), water pumps and rice transplanters (rice planting tools). The following Table 4 shows the realisation of agricultural tools and machinery activities in South Kalimantan Province from 2011-2020 through the budget allocation for the Assistance Task of the South Kalimantan State Budget.

Data on the realisation of agricultural equipment and machinery assistance activities collected from 2011-2020 in the form of agricultural equipment and machinery assistance through APBN data was allocated the most in 2016. This is part of the Ministry of Agriculture's programme, namely the Special Effort or Upsus Programmes for Rice, Maize and Soybean or Pajale Programmes.

Table 4. Realisation of agricultural machinery and equipment activities (2011-2020) in South Kalimantan Province.

No	District/City	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1	Tanah Laut	-	-	711	-	1.574	5.252	-	4.575	740	-
2	Kotabaru	-	-	586	1.121	629	1.404	-	2.337	-	-
3	Banjar	-	-	888	230	1.905	7.599	-	3.892	1.151	-
4	Barito Kuala	-	-	896	146	1.383	16.806	-	4.11	575	-
5	Tapin	-	-	595	302	2.201	7.838	-	3.415	41	-
6	Hulu Sungai Selata	-	-	97	364	1.574	5.41	-	3.909	-	-
7	Hulu Sungai Tenga	-	1.305	409	382	1.966	4.933	-	1.233	-	-
8	Hulu Sungai Utara	-	-	539	-	813	4.581	-	1.077	317	-
9	Tabalong	-	-	257	504	1.261	4.028	-	773	164	-
10	Tanah Bumbu	-	-	612	-	798	2.138	-	-	258	-
11	Balangan	-	-	336	536	1.104	3.464	-	-	-	-
Kalimantan Selatan		-	1.305	5.926	3.584	15.208	63.454	-	25.321	3.247	-

Source: Data Processing (2023)

Realisation of Non-Organic Subsidised Fertiliser Activities in 2012-2021

Non-organic subsidised fertiliser activities consist of urea fertiliser, NPK fertiliser, SP-36 fertiliser and ZA fertiliser. The allocation of subsidised fertiliser assistance has been determined by the Central Government each year and proposed through the e-RDKK application owned by the Ministry of Agriculture. The realisation of non-organic subsidised fertiliser is calculated based on the number of fertilisers realised based on the reports of subsidised fertiliser distributors until the end of the year, which is in December.

The realisation of subsidised non-organic fertiliser in South Kalimantan Province from 2012-2021 is shown in Table 5. Based on the data in Table 5, the largest realisation of subsidised non-organic fertiliser occurred in 2018, reaching 92,454 tonnes.

Realisation of Organic Subsidised Fertiliser Activities in 2012-2021

Organic subsidised fertiliser activities are determined by the central government each year and proposed through the e-RDKK application owned by the Ministry of Agriculture. The calculation of subsidised fertiliser realisation is based on the amount of fertiliser redeemed by farmer groups at registered stores and is calculated in tonnes.

The realisation of subsidised organic fertiliser in South Kalimantan Province from 2012-2021 is shown in Table 6.

Table 5. Realisation of subsidised non-organic fertiliser in South Kalimantan Province (2012-2021).

No	District/City	Amount (tones)									
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
1	Tanah Laut	15.794	16.637	15.35	13.779	13.078	18.047	19.62	17.355	19.249	14.838
2	Kotabaru	4.172	5.284	6.031	5.19	7.017	10.007	10.938	7.741	9.078	9.125
3	Banjar	7.473	6.97	4.663	5.076	4.664	4.829	4.45	4.561	4.049	2.122
4	Barito Kuala	14.71	16.247	14.342	15.024	17.074	16.557	16.979	16.132	17.942	11.415
5	Tapin	6.98	8.471	7.461	9.695	7.184	9.405	8.576	7.544	9.21	7.793
6	Hulu Sungai Selatan	3.013	4.323	3	3.429	2.565	3.24	3.818	3.376	4.178	3.289
7	Hulu Sungai Tengah	8.406	9.347	8.275	9.298	9.177	10.283	10.288	7.484	9.313	7.556
8	Hulu Sungai Utara	149	198	278	70	54	77	96	85	86	73
9	Tabalong	7.703	7.535	5.445	5.084	4.252	5.502	5.197	4.231	3.84	4.237
10	Tanah Bumbu	7.31	8.453	8.244	7.361	7.017	10.638	10.085	7.325	6.892	6.18
11	Balangan	3.43	3.362	2.406	3.138	2.565	2.283	2.408	2.715	2.4	1.699
South Kalimantan		79.14	86.826	75.495	77.143	74.647	90.867	92.454	78.549	86.236	68.326

Source: Data Processing (2023)

Table 6. Realisation of sub sidised organic fertiliser in South Kalimantan Province (2012-2021).

No	District/City	Amount (tones)									
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
1	Tanah Laut	350	610	69	-	22	88	82	61	-	5
2	Kotabaru	35	121	20	32	-	9	67	16	11	1
3	Banjar	162	22	-	-	120	34	20	29	10	7
4	Barito Kuala	2512	1.625	618	731	65	1.617	1.883	1.732	1.321	482
5	Tapin	274	281	394	770	467	281	147	168	128	86
6	Hulu Sungai Selatan	629	360	163	158	457	651	706	625	595	209
7	Hulu Sungai Tengah	635	250	193	249	-	658	812	873	851	850
8	Hulu Sungai Utara	8	9	-	-	22	-	-	-	-	-
9	Tabalong	1069	271	5.445	366	98	38	157	153	39	62
10	Tanah Bumbu	402	343	186	51	44	188	155	173	81	65
11	Balangan	1588	208	116	2	289	121	173	149	230	-
	South Kalimantan	7664	4.099	7.204	2.359	1.583	3.684	4.202	3.978	3.266	1.767

Source: Data Processing (2023)

Panel Data Regression Model Selection of Agricultural Infrastructure Activities and Subsidised Fertilisers on Rice Production in South Kalimantan

Model selection was conducted to fulfil the data requirements for statistical processing using EViews 12. First, the Chow test was conducted to determine the best model between the Common Effect Model and the Fixed Effect Model. The test was conducted to find the probability value at the 5% level. Based on the results of the analysis, the Chow test was obtained in Table 7 of the analysis results on the EViews 12 tool.

Table 7. Chow Test Result.

Effects Test	Statistic	d.f.	Prob.
Cross-section F	71.442168	(10,94)	0.0000
Cross-section Chi-square	236.696792	10	0.0000

Source: EViews Data Processing (2023)

The results of the Chow test Table. 7 shows that the cross section probability value is 0.0000 or <0.05, so the selected model is fixed effect.

Then the Hausman test was carried out to test the right model between the Fixed Effect Model and the Random Effect Model. Based on the analysis results, the Hausman test is obtained in Table 8.

Table 8. Hausman Test Result.

Test Summary	Chi-Sq. Statistic	Chi-Sq.d.f.	Prob.
Cross-section random	81.377005	5	0.0000

Source: EViews Data Processing (2023)

Based on the Hausman test results in Table 8, the cross-section random probability value is 0.0000. This value is smaller than 0.05, this means that H_0 is rejected and H_1 is accepted, so the model chosen is the Fixed Effect Model (FEM).

Classical Assumption Test

The panel data regression results have obtained the best model to be able to estimate the results, one of which is the ordinary least squared (OLS) approach, namely by testing multicollinearity, heterosceda sticity, normality and autocorrelation. According to Nachrowi (2006), in data regression not all classical assumption tests must be carried out with the OLS approach.

Multicollinearity Test

The multicollinearity test aims to test whether there is a high correlation between independent variables in a model. The following is Table 9 of the multicollinearity test results on the regression model performed:

Table 9. Multikoliniearitas Test Result.

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.035119	1193.085	NA
log X_1	0.001035	127.8096	1.022298
logX_2	0.001603	235.3726	1.125636
log X_3	0.001054	135.9432	1.036111
log X_4	0.006713	1080.764	1.187870
log X_5	0.000181	16.09003	1.077871

Source: EViews Data Processing (2023)

Based on Table 9, the variance inflation factor (VIF) value is <10, so multicollinearity occurs but is not significant.

Heteroscedasticity Test

The heteroscedasticity test aims to test whether there is an inequality of variance of errors on all observations between independent variables in a model. The following Table 10 shows the results of the heteroscedasticity test on the regression model using the white test:

Table 10. Heteroskedastisitas Test Result.

F-statistic	2.115916	Prob. F(20,20)	0.0509
Obs*R-squared	27.84175	Prob. Chi-Square(20)	0.1132
Scaled explained SS	13.97305	Prob. Chi-Square(20)	0.8319

Source: EViews Data Processing (2023)

The white test results in Table 10 show the Obs*R-squared value> Chi-Square value and the probability of the Chi-Square value> 0.05 so there is no heteroscedasticity in the model.

Normality Test

The normality test aims to test whether the data entered is normally distributed or not and is seen from its distribution. Normality test is actually not a requirement in the Best Linear Unbiased Estimator (BLUE) and is not a mandatory thing to do Nachrowi (2006). The following fig. 1 is the result of the normality test on this regression model.

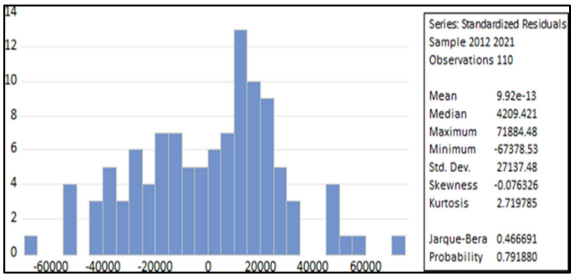

Fig. 1. Normality test result.

Based on the test results in Fig. 1, the Jarque Bera value is 0.466691 with a probability of 0.791880 so that it is greater than 0.05, which means that the data is normally distributed.

Autocorrelation Test

The autocorrelation test aims to test the correlation of error disturbances in a period t with period t-1 or earlier. The following are the results of the autocorrelation test in Table 11.

Table 11. Autocorrelation Test Result.

F-statistic	10.04212	Prob. F(3,32)	0.0001
Obs*R-squared	19.88175	Prob. Chi-Square(3)	0.0002

Source: EViews Data Processing (2023)

Based on the test results in Table 11, it can be seen that the Prob. Chi-Square value <0.05 so that autocorrelation symptoms occur. However, this can be ignored because according to Nachrowi (2006) autocorrelation occurs in time series data, so testing autocorrelation in panel data will be meaningless.

The Effect of Agricultural Infrastructure Assistance and Subsidised Fertilisers on Rice Production Simultaneously (F Test)

The F test is conducted to determine whether the independent variables jointly affect the dependent variable (rice production). To be able to see the results of the F test can be seen in Table 12.

Table 12. Data Panel uji F Test Result.

Root MSE	0.007849	R-squared	0.958387
Mean dependent var	2.499167	Adjusted R-squared	0.935980
S.D. dependent var	0.038953	S.E. of regression	0.009856
Akaike info criterion	-6.125240	Sum squared resid	0.002526
Schwarz criterion	-5.498324	Log likelihood	140.5674
Hannan-Quinn criter.	-5.896952	F-statistic	42.77188
Durbin-Watson stat	2.220876	Prob(F-statistic)	0.000000

Source: EViews Data Processing (2023)

Based on Table 12, we can analyse at the α = 5% level, the F table value is 3.13, while the calculated F value is 42.77188, so it can be concluded that the calculated F value> F table (42.77188> 3.13). The F test can also be seen the probability value, amounting to 0.000000, which means it is smaller than the significance value of 0.05.

The conclusion of the F test is that the variables of irrigation water management for agriculture, land expansion and protection, agricultural machinery assistance, non-organic subsidised fertiliser and organic subsidised fertiliser simultaneously affect rice production in South Kalimantan province.

Coefficient of Determination (Adjusted R-Square)

The coefficient of determination (Adjusted R-Square) can also be seen in Table 12 with the coefficient of determination (R^2) is 0.935980, this means that the model is able to explain the percentage of influence of the independent variable on the dependent variable by 93.59%, while the remaining 6.41% is influenced by other factors outside the regression model.

Effect of Agricultural Infrastructure Assistance and Subsidised Fertiliser on Rice Production Partially (t test)

The t test is conducted to determine the magnitude of the influence of independent variables partially or partially on rice production in South Kalimantan Province, this test is also part of hypothesis testing. To be able to see the results of the t test can be seen in Table 12. Based on Table 12, it can be concluded as follows:

1. The results of the t test can be seen in the probability value, in the variable activities of irrigation water management for agriculture (X_1) and non-organic fertiliser (X_4) have a probability <0.05 so that the variable has an influence (significant) on rice production.
2. In the variable activities of agricultural land expansion and protection (X_2), agricultural machinery assistance (X_3) and organic fertiliser (X_5) have a probability > 0.05 so that the variable does not have an influence (significant) on rice paddy production.

Panel Data Regression Testing Results

Regression test results using the Fixed Effect Model (FEM) based on the best model test. The following is Table 13 of the Fixed Effect Model (FEM) regression results:

Table 13. Panel data regression on rice production.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.593872	0.250130	6.372165	0.0000
log X_1	0.021999	0.010485	2.098107	0.0458
logX_2	0.018472	0.013492	1.369075	0.1827
log X_3	0.009936	0.010144	0.979541	0.3363
log X_4	0.366071	0.111466	3.284135	0.0029
log X_5	0.006032	0.005009	1.204254	0.2393

Source: EViews Data Processing (2023)

Based on the calculation of Table 13, it can be concluded that the calculation of the influence model of irrigation water management activities for agriculture, land expansion and protection, agricultural machinery assistance, non-organic subsidised fertilisers and organic subsidised fertilisers on rice production in South Kalimantan Province is as follows:

$$\log Y = 1.59387 + 0.02199 \log X_1 + 0.018472 \log X_2 + 0.009936 \log X_3 + 0.366071 \log X_4 + 0.006032 \log X_5$$

The above model can be interpreted as follows:

1. The constant of 1.59387 indicates that if the independent variable (irrigation water management for agriculture, land expansion and protection, agricultural machinery assistance, non-organic subsidised fertiliser and organic subsidised fertiliser) is zero, then rice production is 1.59387%.
2. The value of the regression coefficient X_1, namely irrigation water management activities for agriculture of 0.02199, which means that every increase in the budget for irrigation water management for agriculture by 1%, rice production will increase by 0.02199%.
3. The value of the regression coefficient X_2, namely the expansion and protection of agricultural land activities of 0.018472, which means that any increase in the budget for expansion and protection of agricultural land activities by 1%, rice production will increase by 0.018472%.
4. The value of the regression coefficient X_3, namely the assistance of agricultural tools and machinery of 0.009936, which means that any increase in the budget for agricultural tools and machinery assistance by 1%, rice production will increase by 0.009936%.
5. The value of the regression coefficient X_4, namely the realisation of non-organic fertiliser, is 0.366071, which means that every 1% increase in the allocation of non-organic fertiliser will increase rice production by 0.366071%.
6. The value of the regression coefficient 〖X_5, namely the realisation of organic fertiliser is 0.006032 which means that every 1% increase in the allocation of organic fertiliser will increase rice production by 0.006032%.

Problems in the Management of Agricultural Infrastructure Assistance and Subsidised Fertilisers in South Kalimantan Province

Problems with the management of agricultural infrastructure and subsidised fertiliser in South Kalimantan Province are:

1. The lack of awareness of aid recipients to be able to maintain the facilities that have been given, for example, the number of weeds that grow and are not cleaned in tertiary irrigation that has been built.
2. The existence of secondary irrigation channels that are damaged so that when tertiary irrigation channels are built or rehabilitated, the water conditions are not maximised to enter the rice fields.
3. The rice fields have not been fully utilised by farmer groups so that there is the potential for bushes to return.
4. The allocation of agricultural machinery assistance through the South Kalimantan Provincial Satker APBN Fund has not existed since 2020.
5. Not yet optimal use of agricultural tools and machinery in farmer groups, this is due to the low Planting Index (IP) which only plants once a year.
6. In subsidised fertiliser activities, there is still a lack of proposals for the use of organic subsidised fertiliser because farmer groups are more likely to use non-organic fertiliser.

Conclusion

1. Agricultural infrastructure and facilities activities and subsidised fertiliser assistance have a positive effect on rice production in South Kalimantan province.
2. Irrigation water management activities for agriculture and organic subsidised fertiliser have a positive and significant effect on rice production in South Kalimantan Province.
3. Based on the results of the simultaneous test (F test) it can be stated that the assistance of agricultural infrastructure and facilities and subsidised fertilisers in South Kalimantan Province through the Ministry of Agriculture Fund has a significant effect on rice production in South Kalimantan Province.
4. Problems in the management of agricultural infrastructure assistance and subsidised fertilisers include the low awareness of farmer groups in managing agricultural infrastructure and facilities that have been built or assisted and the need for

coordination between institutions in managing infrastructure related to agriculture because it is hampered by authority.

Suggestions

1. The Ministry of Agriculture should continue to allocate agricultural infrastructure assistance and subsidised fertilisers to continue to be able to maintain rice production in South Kalimantan Province, which is one of the largest rice-producing provinces in Indonesia and is directly adjacent to the Archipelago's National Capital in East Kalimantan.
2. Governments Province and goverments district/city must also be able to disburse sufficient budget for the development of agricultural infrastructure and facilities to support the Ministry of Agriculture's state budget.
3. Coordination between institutions must be improved, especially in irrigation management, due to the division of authority of irrigation channels between the central, provincial and district governments.
4. The high cost of non-subsidised fertiliser in the market and the large price difference with subsidised fertiliser should be a concern for the government supervisory apparatus; in this case the Fertiliser and Pesticide Distribution Commission (KP3) to further improve its supervision so that there is no misuse of subsidised fertiliser, especially for food crops.

References

Ahmaddien I, Susanto B. 2020. Eviews 9 : Analisis Regresi Data Panel. Ideas Publishing.

Ahsani AF. 2021. Pengaruh subsidi pupuk, Dana Alokasi Khusus pertanian dan bantuan alsintan terhadap produksi padi (studi kasus di Provinsi Jawa Timur Tahun 2015-2019). Jurnal Ilmiah Mahasiswa FEB **9(2),** 1-12. http://repository ub.ac.id/id eprint/185101.

Hamid, Rahmad Solling, Samsul Bachri, Salju, Muhammad Ikbal. 2020. Panduan praktis ekonometrika: Konsep dasar dan penerapan menggunakan EViews 10. Banten: CV. Aa. Rizky.

Nachrowi D, Usman H. 2006. Pendekatan Populer dan Praktis Ekonometrika untuk Analisis Ekonomi dan Keuangan. Jakarta: Lembaga Penerbit Fakultas Ekonomi Universitas Indonesia

Soetrisno. 2011. Dasar-Dasar Ilmu Keuangan Negara. Yogyakarta: Fakultas Ekonomi Universitas Gajah Mada.

Sulaiman AA, Setiawan BI, Rejekiningrum P, Kartiwa B, Aquino FY, Apriyana Y, Sofiyudin HA, Andayani A, Subagyono A. 2018. Menata Jaringan Irigasi, Mempercepat Swasembada Pangan. Bogor: IAARD Press.

Sumarsono S. 2003. Ekonomi Manajemen Sumber Daya Manusia. Yogyakarta: Graha Ilmu.

Widarjono A. 2009. Ekonometrika Pengantar dan Aplikasinya, Edisi Ketiga. Yogyakarta: Ekonesia