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Impact of Special Allocation Fund (DAK) for Irrigation on Irrigation Conditions in Indonesia

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Abstract: The Special Allocation Fund for Irrigation provides financial assistance from the National Government to selected local governments to fund irrigation management so that they can support the national agenda in achieving food security. Despite its purpose of supporting local government budget, the Special Allocation Fund has been widely used as the main funding for most development projects, including irrigation. Since 65.6% of the total irrigation areas in Indonesia have been delegated to the local governments, and more than half of these areas are broken, optimization of the Special Allocation Fund for Irrigation is urgently required to maximize its impact. This study aims to investigate the impact of the Special Allocation Fund for Irrigation on the irrigation conditions in Indonesia for 2018 fiscal year, focusing on 43 selected local governments. This study employed linear regression analysis and hypotheses tests to explain the relationship between the Special Allocation Fund for Irrigation and the Local Government Budget for Irrigation Operation and Maintenance as independent variables with outcome performance indicators such as irrigation conditions and harvested paddy field area as dependent variables. The results of this study indicate that in 2018 the Special Allocation Fund for Irrigation did not significantly improve irrigation conditions or increase paddy field areas. Therefore, improvement in how the Special Allocation Fund for Irrigation should be allocated is needed with regard to its original purpose. These findings should consequently be considered with the utmost caution because they are only based on a short period of study. Future research should use a longer period of data collection to provide more reliable results.

Keywords: Special Allocation Fund for Irrigation, irrigation conditions, harvested paddy field.

灌溉特别拨款基金（达克）对印度尼西亚灌溉条件的影响

摘要：灌溉特别拨款基金向选定的地方政府提供财政援助，为灌溉管理提供资金，以便它们能够支持实现粮食安全的国家议程。尽管专项拨款基金的目的是支持地方政府预算，但它已被广泛用作包括灌溉在内的大多数发展项目的主要资金。由于印尼 65.6%的灌溉面积已下放给地方政府，而其中一半以上已被破坏，迫切需要优化灌溉专项拨款基金，以最大限度地发挥其作用。本研究旨在调查灌溉专项拨款基金对印度尼西亚 2018 财年灌溉条件的影响，重点关注 43 个选定地方政府。本研究采用线性回归分析和假设检验，以灌溉条件、稻田收获面积等成果绩效指标为因变量，解释了灌溉专项资金与地方政府灌溉运维预算之间的

关系。研究结果表明，2018 年灌溉专项资金并没有显着改善灌溉条件或增加水田面积。因此，在水利专项资金的用途上，需要改进其分配方式。因此，应极其谨慎地考虑这些发现，因为它们仅基于短期研究。 未来的研究应该使用更长时期的数据收集来提供更可靠的结果。

关键词：灌溉专项资金、灌溉条件、收割稻田.

1. Introduction

The availability of irrigation services plays an important role in making efforts to reach the agenda of national food resilience [1]. The development of rice irrigated areas has stimulated the increasing of harvest areas and paddy production, so rice self-sufficiency first occurred in Indonesia in 1984, from the beginning as a rice importer country. Some recent research on the irrigation level also shows the important role of irrigation in producing paddy in some areas of Indonesia, such as the irrigation area of Parigi Moutong-Sulawesi Tengah by Lien Damayanti (2010) and the irrigation area of Krueng Pase-Aceh by Murdiana and Fadli (2015). Based on the data of the Agriculture Ministry in 2017, 93% of the harvest area and 95% of paddy production in Indonesia comes from paddy rice and paddy that is cropped in irrigated rice areas. However, according to the Statistical Center Institution (BPS), rice area is an agricultural area that is blocked and boundaries by embankments (freestyle) and channels for holding/flowing water, which is a characteristic of an irrigated rice area. The availability of irrigation services is now a pillar of food resilience, mainly on the sub-system of food availability that has a function to guarantee the food supply for fulfilling all population demand in quality, quantity, diversity, and safety [2]. Government spending in the irrigation sector has stimulated the preserved irrigation infrastructure that guarantees the availability and access of rice areas for farmers [3].

The Special Allocation Funding (DAK) is one of the funding assistance instruments from the Center Government for maintenance of the government problem in the region. DAK should be as the supporting funding source of the Income and Regional Spending Budget (APBD) precisely becomes as main funding source of modal spending for more regional government for developing various means and physical facilities including irrigation [4]. The trend of modal spending decreasing in APBD since recent years has the potential to have a direct impact on the availability of irrigation management funding in regional areas, mainly if there is another government problem that is assumed to have more priority. The DAK on physical irrigation fields now becomes the one assistant instrument of irrigation funding from the Center Government, which is sustainable for the Regional Government because it is a part of the balance funding that is allocated every year in the Income and Country Spending Budget (APBN). The other assistant instrument through grant gift to APBD until now is still very limited from the scope of Regional Government acceptor, budget amount, and period of grant gift. From 2015 to 2019, on average, more than 400 regional governments obtain the DAK budget for irrigation fields every year. However, the APBD funding is now used more for the operation and maintenance (OP) activity of irrigation network because the consideration that the activity may not be funded through the DAK of irrigation field. The funding of irrigation network OP through APBD is also a requirement of proposals for DAK of irrigation fields.

Most irrigation management authorities now are delegated to the Regional Government after the decentralization of government problem maintenance in irrigation fields. The Regional Government now has 99.3% of irrigation area total authority with the scope of 65.6% of irrigation area total [5]. The Regional Government now becomes the strategic parties in making efforts to reach the agenda of national food resilience that becomes the authority of Regional Government, which will have a direct impact on national paddy production. Based on the audit assessment by the Ministry of General Work and Housing in 2014, 59% of the surface irrigation area that becomes the authority Regency/Urban Regional Government is in a damaged condition. To consider the strategic role of the regional government in managing most irrigation in Indonesia, the DAK physical funding of irrigation fields has to be optimally used in the scheme to support the national food resilience agenda. The budget allocating is necessary starting to be prioritized to the Regional Government which is contributed on the aim of irrigation field DAK. This agrees with the trend of physical DAK budget decreasing on the irrigation field in recent years, from 5.5 trillion rupiah in the beginning of 2015 until only 1.5 trillion rupiah in 2022.

This research intends to evaluate the effectiveness of physical DAK budgeting on irrigation fields in 43 selected regencies/cities spread across 13 provinces in the fiscal year budget of 2018. The regression analysis and hypothesis test were used to test the effect of physical DAK on irrigation field to the condition of irrigation network and paddy harvest area in two separate analyzes. The OP funding of the irrigation network comes from APBD and as the proposal

requirement of DAK budgeting. The irrigation field will also be used as a part of the analysis in this research. The indicators of irrigation network and harvest area condition were selected as the outcome performance of the physical DAK on the irrigation field.

2. Literature Review

Special Allocating Funding (DAK) is funded that is sourced from the income of Country Income and Spending (APBN), which is allocated to the certain regional by the aim is to help funding program, activity, and/or certain policy that becomes as the national priority and helping the public service operationalization in region (Laws No 1, 2022 about the Finance relation between Center and Regional Government). The allocation of the DAK budget generally functions as the supporting incentive to APBD so can more contribute to reaching various agendas of national priority. Filed/ sub-field of DAK and regional that is as the acceptor of DAK budget is determined every year and can be changed regarding the national priority, which is determined in President Rule about the Government Work Plan. From 2019 until 2021, which is the focus of this research, DAK is divided into two types: physical DAK (like road, irrigation, drinking water, etc.) and non-physical DAK (like School Operational Funding, Healthy Maintenance Funding, etc.). Physical DAK is used to support the development of regional service means and infrastructure, whereas non-physical DAK is used to support regional public service operationalization.

The allocation of the DAK budget for physical irrigation fields is a consequence of the decentralization concept of water resources management, including the irrigation problem, which was introduced in Law No 7, 2004 on water resources and updated through Law No 17, 2019 on water resources. The irrigation problems, which are again the center government authority [6], become to be distributed to 3 government levels (Center, Province regional, and Regency/City regional) by referring to the existence of irrigation network toward administration area and criteria of area strata. The regency/city regional government is now responsible for irrigation management, which is the area is less than 1,000 ha in a regency/city regional. The irrigation area, irrigation network condition, and irrigation area location are technical criteria in the design of DAK for physical irrigation fields [7]. Along with the agenda of food resilience that still becomes the national priority every year, the DAK about physical irrigation field now is as a DAK field that still continues since the first budgeting of DAK to be implemented in 2003. In 2023, there are 33 DAK fields including the irrigation field, which is far increasing to be compared with 20 years ago, when only five fields were included in the irrigation infrastructure.

In general, the DAK plan starts after the theme, objective, policy direction, and development priority for the plan year that is arranged by the Ministry of Nasional Development Plan, and it is approved by the President. The theme, objective, policy direction, and development priority become the basic of arrangement and proposal of program and activity from ministry/ institution, regional government, and stakeholder of development (Government Rule chapter 7 Np 17, 2017 about the synchronization of plan and budgeting process) including plan of type/field/ sub-field of DAK due to the determination of priority regional. The regional government that fulfills the general criteria (fiscal condition and regional Finance ability), special criteria (regional characteristic and regional aspect), and technical criteria (technical condition in every DAK field) can propose a project funded through the DAK in the platform. Collaboration of Plan and Budget Performance Information (KRISNA): The Ministry of PPN/BAPENAS and related ministries/institutions carry out the assessment of DAK proposals per type/field/sub-field per region, which then becomes the basic of budget allocation analysis by the Ministry of Finance. The mechanism of DAK allocation in the period after 2015 uses the collaboration between the directive policy of the central government (top-down) and the proposal of the regional government (bottom-up) based on suitability with national priority. The allocation of DAK per type/field/ sub-field per region, including the DAK of physical irrigation field, is agreed upon and determined between the government and DPR for inclusion in the president's rule regarding the details of APBN.

Regarding the Guidance of Infrastructure DAK Management Operational about General Work and Housing, budget year 2021 [8] and the utilization of DAK about irrigation field, include some activity menus as follows: a) development of irrigation network (preparation of irrigation network in the certain region that there isn't any yet irrigation network); b) increasing of irrigation network (to increase the available unction and irrigation network condition or the activity to increase service area on the available irrigation network by considering environmental condition change of irrigation area; c) rehabilitation of irrigation network (improvement of irrigation network for returning back the function and service of irrigation like before); and d) development of flood control infrastructure (to prepare/ develop the flood control infrastructure so can protect the irrigation area from food risk). Based on the monitoring in the last few years, the regional government tends to use the DAK budget of irrigation fields for the rehabilitation menu of irrigation networks, while the use for the development menu of flood control infrastructure is relatively small every year. In 2022, 59.5% of the DAK budget for irrigation fields will be used for rehabilitating the irrigation network, followed by increasing the irrigation network (26.8%), development of the

irrigation network (7.5%), development of flood control infrastructure (1.7%), and supporting costs (4.5%). The various menu of DAK activity on the irrigation field is hope to be able to get impact of improvement about irrigation network condition, so it can be contributed in the increasing of irrigation service that is contributed on planting area and paddy harvest.

3. Research Methods

3.1. Research Assumption

This research is focused on the DAK budget impact of irrigation fields for the 2018 fiscal year on the irrigation network condition and irrigation service in the form of paddy harvest area at the regency/city level. The paddy harvest service is used as the paddy crop area as the impact of irrigation service by considering the availability data in the Statistical Center Institution (BPS). The irrigation network condition is obtained by taking the difference between the irrigation area that is included in the Ministry Rule of General Work and Housing No 14/PRT/M/2015 about the criteria and determination of irrigation area by damaged data of irrigation area which is reported by Regional Government of Regency/City when proposing the DAK of irrigation field. Generally, the physical construction of government projects is started and ended on the second semester in implementation year. This condition causes the impact difference in irrigation field DAK to the indicator of irrigation network condition and harvest area. The intervention of irrigation field DAK for 2018 fiscal year will be directly impacted on the irrigation network condition change in 2018. However, the impact on the new harvest area will be recorded in 2019 by considering the trend of the main cropping season schedule of paddy from October to March [9]. The funding intervention impact of irrigation field DAK is different from the intervention of the other irrigation funding that is OP of irrigation network through APBD. The implementation of irrigation network OP is carried out at the beginning of the year implementation, so the impact on the condition and paddy harvest area can be felt in the same year. The illustration of irrigation funding impact on the two indicators of irrigation network condition and harvest area is presented in Table 1.

Table 1 Impact assumption of irrigation funding

The type of funding	Impact towards	
	Irrigation network conditions	Harvest area
A. DAK Irrigation Field		
2018	2018	2019
B. APBD funding for the OP of irrigation		
2018	2018	2018

3.2. Data Source

Based on the assumption of irrigation funding impact on the irrigation network condition and harvest area above, this research will use secondary data from the regency/ city level for 2018. However, the use of data for 2019 is limited to the harvest area as the implementation intervention impact of irrigation field DAK for the 2018 fiscal year. The selection of the research period for the 2018 fiscal year considers 3 things as follows: a) since 2018, there has been an improvement in the analysis of paddy data by using the Area Sample Scheme Method, therefore, it is the basic year of paddy data analysis for the next years [10]; b) There has been a disruption in the implementation of irrigation field DAK in the 2020 fiscal year due to the pandemic COVID-19, which is the plan is carried out in 2019; c) Since 2021, there has been a limitation on the amount of regency/city that can propose the irrigation field DAK, so it has an impact on the availability of technical data for unselected regency/city. The secondary data used in this research consists of: a) Recapitulation of irrigation area for every government level; b) DAK budget of irrigation field on the regency/city level; c) Funding of irrigation network OP that comes from APBD; d) Damaged condition of irrigation network as the authority of Regency/ City Regional Government; and e) Paddy harvest area in the level of Regency/City Regional Government. The various secondary data were obtained from the Ministry of National Development Plan (BAPENAS), Ministry of General Work and Housing, Ministry of Finance, and Statistical Center Institution (BPS) at the provincial level as well as the regency/city level.

3.3. Research Location

The selection of location in this research is carried out through the purposive sampling approach and based on two criteria: authority scope and total irrigation area in the regency/city. The purposive sampling approach is a method of sampling based on the consideration and certain criteria for determining a research sample [11]. Along with the decentralization of government problem in irrigation field, the management of irrigation in a Regency/City is carried out by three government levels (Center, Province Regional, and Regency/City Regional) that is regarding with the irrigation area due to each authority. Minimal scope is 80% of irrigation area total in the selected Regency/City, which is selected for minimizing the bias of irrigation management intervention effect by Center Government and Province Regional Government to the Regencies/Cities that become as this research locations. Hence, the outcome performance of irrigation service in the research location is an impact illustration of the accepted irrigation field DAK. In addition, the location selection in this research is also carried out by prioritizing the regency/city that has an irrigation area total of more

than 10,000 ha. The criteria of area are adopted from the definition of national strategy irrigation area and to be used for more focus on location selection in this research. The application of the two criteria to research location selection is presented in Appendix 1. Based on the two criteria, 45 selected regencies/cities were obtained that spread in 13 provinces, as presented in Table 3. However, the data source used in this research in the selection of research location criteria is recapitulation of irrigation area as the authority of Government, Province Government, and Regency/City Government as presented in Appendices 1, 2, and 3 on the Ministry Rule of General Work and Housing No. 14/PRT/M/2015 about the criteria and determination of irrigation area. Two Regencies/Cities (Toba Samosir Regency and Sintang Regency) that are not reported the OP budget of irrigation network in the 2018 fiscal year are removed from the research sample population, so the selected Regency/City as the population in this research becomes 43 Regencies/Cities, as presented in Appendix 2.

Table 2 Illustration of research location selection based on authority scope and irrigation area

No.	Regency/city	Total irrigation area	The percentage of government authorities			Explanation
			Center	Province	Regency/city	
1	Indramayu	109,844 ha	91.7%	4.0%	4.4%	Not selected
2	Bogor	49,138 ha	2.8%	8.5%	88.7%	Selected
3	Sukabumi	2,300 ha	-	7.9%	92.1%	Not selected

3.4. Data Analysis

This research uses regression to evaluate the effect of irrigation field DAK on the irrigation network condition and paddy harvest area. Regression is a relation measurer between two or more variables that is expressed in the relation or function, which is generally marked with x and y. The variable in regression usually has the causal characteristic or cause and effect, so there is a variable that is determined and determined variable [12]. The X-variable can also be mentioned as an independent variable, while the y-variable is the dependent variable. In this research, the independent variable is Special Allocation Funding of Irrigation Field and APBD Funding for irrigation network OP, while the dependent variable is irrigation network condition and paddy harvest area. The regression analysis will be carried out for each dependent variable to the two independent variables using Microsoft Office Excel 2019. The evaluation will also be carried out in this research to determine whether the independent variable is significantly affected by the dependent variable or not (simultaneous significant test or F-test) and to see how far the effect of every independent variable to the dependent variable partially (partial significant test or T-test). Generally, the regression analysis used in this research is multiple linear regressions as follows:

$$Y = a + b_1X_1 + b_2X_2 + \ldots\ldots + b_nX_n$$

where:

Y - dependent variable;

X_n - independent variable;

a - constant;

b_n - regression coefficient to Y.

Multiple linear regression analysis will be carried out for every relation between the independent and the dependent variables as follows:

1. The relation between irrigation field DAK (X_1) and funding of irrigation network OP (X_2) in the 2018 fiscal year to the irrigation network condition in the 2018 fiscal year (Y); and
2. Relationship between irrigation field DAK (X_1) and irrigation network OP (X_2) in the 2018 fiscal year to the paddy harvest area in the 2019 fiscal year (Y)

4. Results and Discussion

4.1. Results of Multiple Linear Regression Analysis-1

Based on the analysis of multiple linear regressions for measuring the relation of irrigation field DAK (X_1) and irrigation network OP funding (X_2) in the 2018 fiscal year to the irrigation network condition (Y) in the 2018 fiscal year, we obtained the following result:

$$Y = 8{,}888 - 0.037X_1 + 0.255X_2 \quad (1)$$

where:

Y - condition of irrigation network (good) in the 2018 fiscal year;

X_1 - irrigation field DAK in the 2018 fiscal year;

X_2 - irrigation network OP funding in the 2018 fiscal year;

a – constant;

b_n - regression coefficient to Y.

However, the results of the summary output for the analysis of multiple linear regressions on relation-1 are presented in Table 3.

Table 3 Summary output (Own study)

Regression Statistics	
Multiple R	0.19014064
R Square	0.036153463
Adjusted R Square	-0.012038864
Standard Error	6604.434008
Observations	43

The result of the determination coefficient (R^2) from the relation equation-1 shows the ability of the independent variable (irrigation field DAK and irrigation network OP funding) to explain the dependent variable (irrigation network condition). Table 3 shows that the value of the determination coefficient for equation-1 is 0.0362, which means that

irrigation field DAK and irrigation network OP funding only affects about 3.62% of the irrigation network condition. Besides that, based on the simultaneous significant test as presented in Table 4, it shows that the result of the F-test is 0.75 because the significance value is more than 0.05. This means that the irrigation fields DAK and irrigation network OP funding together do not significantly affect the irrigation network condition. However, the result of the partial regression test, as presented in Table 5, shows that the significant value is more than 0.05 for every independent variable. This means that the irrigation field DAK and irrigation network OP funding partially does not significantly affect the irrigation network condition.

Table 4 Analysis of variance (ANOVA) – analysis result-1 (Own study)

	df	Sum of Squares	Mean Square	F	Significance F
Regression	2	65444508.91	32722254.45	0.750191273	0.478804062
Residual	40	1744741943	43618548.56		
Total	42	1810186451			

Table 5 Coefficients (Own study)

	Coefficients	Std. Error	t Stat	P-value
Constant	8887.57576	1664.492228	5.33951172	3.99154E-06
X_1	-0.03733901	0.10613839	-0.35179552	0.726838213
X_2	0.255320376	0.226924645	1.125132867	0.267238885

4.2. Result of Multiple Linear Regression Analysis-2

Based on the analysis result of multiple linear regressions for measuring the relation of irrigation field DAK (X_1) and irrigation network OP funding (X_2) in the 2018 fiscal year to the paddy harvest area (Y) in the 2019 fiscal year, the equation:

$$Y = 27{,}946 – 0.172X_1 + 1.501X_2 \quad (2)$$

where:

Y - paddy harvest area in the 2019 fiscal year;

X_1 - irrigation field DAK in the 2018 fiscal year;

X_2 - irrigation network OP funding in the 2018 fiscal year;

a – constant;

b_n - regression coefficient to Y.

However, the results of the summary output for the analysis of multiple linear regressions on relation 2 are presented in Table 6.

Table 6 Summary output (Own study)

Regression Statistics	
Multiple R	0,312817679
R Square	0,097854901
Adjusted R Square	0,052747646
Standard Error	22299,71735
Observations	43

The result of the determination coefficient (R^2) from the relation equation-2 shows the ability of the independent variable (irrigation field DAK and irrigation network OP funding) to explain the dependent variable (irrigation network condition). Table 6 shows that the value of the determination coefficient for Equation 2 is 0.0978, which means that irrigation field DAK and irrigation network OP funding only affect about 9.79% of the irrigation network condition. Besides that, based on the simultaneous significant test as presented in Table 7, it shows that the result of the F-test is 2.17 because the significance value is more than 0.05. This means that the irrigation fields DAK and irrigation network OP funding together do not significantly affect the irrigation network condition. However, the result of the partial regression test, as presented in Table 8, shows that the significant value is more than 0.05 for every independent variable. This means that the irrigation field DAK and irrigation network OP funding partially does not significantly affect the irrigation network condition.

Table 7 Analysis of variance (ANOVA) model-2 (Own study)

	df	Sum of Squares	Mean Square	F	Significance F
Regression	2	2157569994	1078784997	2,169382743	0,127505197
Residual	40	19891095762	497277394		
Total	42	22048665756			

Table 8 Coefficients (Own study)

	Coefficients	Std. Error	t Stat	P-value
Constant	27945.79449	5620.119177	4.972455852	1.29259E-05
X_1	-0.171937991	0.358373797	-0.479772776	0.634002063
X_2	1.500580803	0.766205768	1.958456677	0.05717523

This research aims to evaluate the effectiveness of DAK budgeting of physical irrigation fields in the 2018 fiscal year in 48 selected regencies/cities spread across 13 provinces. This research will use secondary data from the regency/ city level for the period of 2018. However, the use of data for 2019 is limited to the harvest area as the implementation intervention impact of irrigation field DAK for the 2018 fiscal year. The selection of research period on 2018 fiscal year considers 3 things as follows: a) since 2018, there has

been carried out the improvement of analysis way about paddy data. The test result through the multiple linear regression shows that irrigation field DAK in the 2018 fiscal year and funding of irrigation network OP, which becomes the requirement of irrigation field DAK proposal, only affect the irrigation network condition in the 2018 fiscal year by about 3.62% and the effect on the paddy harvest area in the 2019 fiscal year by about 9.79%. The test result simultaneous as well as partially also shows that the physical DAK of irrigation field in the 2018 fiscal year and the funding of irrigation network OP in the 2018 fiscal year do not significantly affect the irrigation network condition and paddy harvest area. This finding is consistent with the research result of Sirait [13] in the 2019 budget journal, which concluded that the allocation of irrigation field DAK and agriculture field DAK has not been right on target for stimulating the consolidation of food resilience and implementing food sovereignty. This conclusion is due to the 32.8% area with still less precise allocation with the final aim of policy about DAK of irrigation and agriculture fields.

5. Conclusion

This research is also not the last from the various limitations that potentially affect the finding result. The research result may be different if the data period used is far longer. Besides that, although becoming a requirement in proposing the DAK of irrigation field, the Ministry of National Development and Plan (BAPENAS) as well as the Ministry of General Work and Housing have not had the instrument to perform the verification and validation on the damaged data of irrigation network which is reported by Regency/City Regional Government. The inaccuracy-damaged data of the irrigation network has the potential to affect the finding results in this research. Therefore, further research is necessary to consider the various limitations.

The finding results in this research, although with various limitations, can become an indication that there is a need for improvement in planning and budgeting the DAK of irrigation fields in the future. The reporting of damaged data on irrigation networks needs to be completed with the mechanism of verification and validation by the center government, such as through the River Region Institution (BWS), as the work unit of the center government, which is located in the Regency/City Regional Government. The DAK budgeting of irrigation fields also needs to be focused on by the government to contribute to reaching the national agenda in the field of food resilience by considering the decreasing trend on the DAK budget of irrigation fields.

References

[1] HIDAYAT F., RASYAD A., ZULKARNAIN, BUSTAMI A.L., & LIMANTARA L.M. Dependable discharge of Molek irrigation water requirement related to the participation perspective of irrigation management. *Journal of Southwest Jiaotong University*, 2022, 57(3): 300-310

[2] ASMELITA, LIMANTARA L.M., BISRI M., SOETOPO W., & FARNI I. Allocation of existing water irrigation in Panti Rao. *Journal of Southwest Jiaotong University*, 2022, 57(3): 355-362

[3] ZAINUDDIN. Dampak dana alokasi khusus (DAK) pertanian dan irigasi terhadap produksi padi sawah dan ketahanan pangan kabupaten/kota di Provinsi Jambi. *Jurnal Media Agribisnis*, 2021, 6(2): 73-85. https://doi.org/10.33087/mea.v6i2.98

[4] MUJIWARDHANI A. *Dana alokasi khusus di Indonesia*. Direktorat Jenderal Anggaran, Kementerian Keuangan Tahun 2022.

[5] Indonesian Republic. *Peraturan Menteri Pekerjaan Umum dan Perumahan Rakyat Nomor 14/PRT/M/2015 tentang Kriteria dan Penetapan Daerah Irigasi*, 2015

[6] Republik Indonesia. *Undang Undang Nomor 11 Tahun 1974 tentang Pengairan*, 1974

[7] Republik Indonesia. *Peraturan Menteri Pekerjaan Umum dan Perumahan Rakyat (Ministry Rule of General Work and Housing) No. 47/PRT/M/2015 tentang Petunjuk Teknis Penggunaan Dana Alokasi Khusus Bidang Infrastruktur*, 2015.

[8] Indonesia Republic. *Peraturan Menteri Pekerjaan Umum dan Perumahan Rakyat (Ministry Rule of General Work and Housing) No. 5 Tahun 2021 tentang Petunjuk Operasional Pengelolaan Dana Alokasi Khusus Infrastruktur Pekerjaan Umum dan Perumahan Rakyat Tahun Anggaran 2021*.

[9] SAEIN. Menentukan jadwal waktu tanam padi berdasarkan Pranoto Mongso. *Pusat Penyuluhan Pertanian, Kementerian Pertanian*, 2019. Diakses melalui http://cybex.pertanian.go.id/mobile/artiart/73276/Menentukan-Jadwal-Waktu-Tanam-Padi-Berdasarkan-Pranoto-Mongso-/pada

[10] BADAN PUSAT STATISTIK. Upaya Perbaikan Data Padi Dengan Metode Kerangka Sampel Area (KSA) 2018. *Publikasi Badan Pusat Statistik* No: 05110.1805, 2018.

[11] SHARMA G. Pros and cons of different sampling techniques. *International Journal of Applied Research*, 2017, 3(7): 749-752

[12] KURNIAWAN R. and YUNIARTO B. *Analisis regresi: sasar dan penerapannya dengan R*. Prenada Media, 2016

[13] SIRAIT R. Analisis alokasi DAK fisik bidang ertanian dan DAK Penugasan Bidang Irigasi. *Jurnal Budget*, 2019, 4(2): 159-177.

参考文:

[1] HIDAYAT F.、RASYAD A.、ZULKARNAIN、BUSTAMI A.L. 和 LIMANTARA L.M. 莫莱克灌溉用水需求的可靠排放与灌溉管理的参与角度相关。西南交通大学学报, 2022, 57(3): 300-310

[2] ASMELITA、LIMANTARA L.M.、BISRI M.、SOETOPO W.、和 FARNI I。潘蒂拉奥现有灌溉用水的分配。西南交通大学学报, 2022, 57(3): 355-362

[3] 扎努丁。占碑省农业和灌溉特别拨款资金（达克）对低地水稻生产和区/市粮食安全的影响。媒体农业企业杂

志，2021，6（2）：73-85。https://doi.org/10.33087/mea.v6i2.98
[4] MUJIWARDHANI A. 印度尼西亚特别拨款基金。2022 年财政部预算总局。
[5] 印度尼西亚共和国。公共工程和公共住房部关于灌溉区标准和指定的第 14/PRT/M/2015 号条例，2015
[6] 印度尼西亚共和国。1974 年关于灌溉的第 11 号法律，1974
[7] 印度尼西亚共和国。公共工程和公共住房部条例（一般工作和住房部规则）第 1 号 47/选择性 RT /中号/2015，关于 2015 年基础设施专项拨款使用技术指南。
[8] 印度尼西亚共和国。公共工程和公共住房部条例（一般工作和住房部规则）第 1 号 2021 年第 5 号《2021 财年公共工程和公共住房基础设施专项拨款管理操作指引》.
[9] SAEIN. 根据普拉诺托蒙索确定水稻种植时间表。农业部农业推广中心，2019 年。访问 http://cybex.pertanian.go.id/mobile/artiart/73276/Menentukan-Jadwal-Waktu-Tanam-Padi-Berdasarkan-Pranoto-Mongso-/pada
[10] 统计中心。使用 2018 年区域抽样框架（沙特阿拉伯王国）方法改进稻米数据的努力。中央统计局出版物编号：05110.1805，2018。
[11] SHARMA G. 不同采样技术的优缺点。国际应用研究杂志，2017，3(7)：749-752
[12] KURNIAWAN R. 和 YUNIARTO B. 回归分析：目标及其与右.普雷纳达媒体的应用，2016
[13] SIRAIT R. 农业部门实物达克分配和灌溉部门达克分配分析。预算杂志，2019，4(2)：159-177。

Appendix 1 Selected local governments (Analysis from the Ministry Rule of General Work and Housing No. 14/PRT/M/2015 regarding the criteria and determination of irrigation area)

PROVINCE	NO	SELECTED LOCAL GOVERNMENT	IRRIGATION UNDER GOVT AUTHORITY (HA)				PERCENTAGE OF AUTHORITY			
			CENTRAL	PROVINCE	LOCAL	TOTAL	CENTRAL	PROVINCE	LOCAL	TOTAL
Aceh	1	Aceh Tengah	-	-	16.010	16.010	0%	0%	100%	100%
	2	Aceh Barat	-	1.000	15.660	16.660	0%	6%	94%	100%
	3	Bener Meriah	-	1.270	14.617	15.887	0%	8%	92%	100%
Sumatera Utara	4	Toba Samosir	-	3.005	14.068	17.073	0%	18%	82%	100%
	5	Dairi	-	1.008	19.090	20.098	0%	5%	95%	100%
	6	Nias Selatan	-	-	10.787	10.787	0%	0%	100%	100%
	7	Humbang Hasundutan	-	4.714	21.279	25.993	0%	18%	82%	100%
Sumatera Barat	8	Solok	-	7.471	31.139	38.610	0%	19%	81%	100%
	9	Sijunjung	200	1.158	9.253	10.611	2%	11%	87%	100%
	10	Tanah Datar	3.000	3.760	29.471	36.231	8%	10%	81%	100%
	11	Lima Puluh Kota	-	1.657	23.186	24.843	0%	7%	93%	100%
Lampung	12	Lampung Barat	-	1.839	11.497	13.336	0%	14%	86%	100%
	13	Tanggamus	488	4.874	29.359	34.721	1%	14%	85%	100%
	14	Pesawaran	-	2.099	19.538	21.637	0%	10%	90%	100%
Jawa Barat	15	Bogor	1.371	4.159	43.608	49.138	3%	8%	89%	100%
	16	Garut	-	1.323	17.521	18.844	0%	7%	93%	100%
	17	Tasikmalaya	5.001	4.853	58.011	67.865	7%	7%	85%	100%
	18	Kuningan	-	4.198	22.057	26.255	0%	16%	84%	100%
	19	Sumedang	-	2.995	14.424	17.419	0%	17%	83%	100%
Jawa Tengah	20	Wonosobo	-	60	21.050	21.110	0%	0%	100%	100%
	21	Magelang	3.366	1.355	35.662	40.383	8%	3%	88%	100%
	22	Klaten	2.003	2.737	31.928	36.668	5%	7%	87%	100%
	23	Wonogiri	439	976	28.784	30.199	1%	3%	95%	100%
	24	Blora	-	658	17.254	17.912	0%	4%	96%	100%
	25	Rembang	564	1.590	21.193	23.347	2%	7%	91%	100%
	26	Jepara	60	2.493	29.319	31.872	0%	8%	92%	100%
	27	Semarang	-	5.005	32.687	37.692	0%	13%	87%	100%
	28	Temanggung	53	2.439	17.711	20.203	0%	12%	88%	100%
	29	Batang	3.246	1.176	18.231	22.653	14%	5%	80%	100%
DIY	30	Sleman	4.602	1.215	25.814	31.631	15%	4%	82%	100%
Jawa Timur	31	Trenggalek	-	484	9.807	10.291	0%	5%	95%	100%
	32	Blitar	1.637	2.143	28.404	32.184	5%	7%	88%	100%
	33	Bondowoso	1.908	4.231	28.476	34.615	6%	12%	82%	100%
Kalimantan Barat	34	Landak	-	141	19.042	19.183	0%	1%	99%	100%
	35	Sanggau	-	1.660	9.599	11.259	0%	15%	85%	100%
	36	Sintang	-	-	10.529	10.529	0%	0%	100%	100%
Kalimantan Tengah	37	Barito Selatan	-	-	11.976	11.976	0%	0%	100%	100%
Kalimantan Selatan	38	Tanah Laut	-	-	16.640	16.640	0%	0%	100%	100%
	39	Tabalong	-	-	26.096	26.096	0%	0%	100%	100%
Kalimantan Timur	40	Kutai Barat	-	1.000	15.249	16.249	0%	6%	94%	100%
	41	Kutai Kartanegara	-	3.605	27.850	31.455	0%	11%	89%	100%
Sulawesi Selatan	42	Bantaeng	-	-	17.245	17.245	0%	0%	100%	100%
	43	Barru	-	1.895	11.776	13.671	0%	14%	86%	100%
	44	Tana Toraja	-	-	14.238	14.238	0%	0%	100%	100%
	45	Toraja Utara	-	1.230	10.129	11.359	0%	11%	89%	100%
TOTAL			27.938	87.476	957.264	1.072.678	3%	8%	89%	100%

Appendix 2 Dataset used (Consolidated data from various Indonesian ministries, 2018-2019)

PROVINCE	NO	SELECTED LOCAL GOVERNMENT	SAF for Irrigation 2018 (IDR Million)	O&M Budget 2018 (IDR Million)	Irrigation Condition 2018 (Ha)		Harvested Paddy Field 2019 (Ha)
					Broken	Good	
Aceh	1	Aceh Tengah	49.819	225	5.515	10.495	3.262
	2	Aceh Barat	6.317	260	11.723	3.937	11.097
	3	Bener Meriah	6.803	96	10.085	4.532	952
Sumatera Utara	4	Dairi	6.611	1.179	7.728	11.362	9.496
	5	Nias Selatan	6.380	850	9.605	1.182	7.952
	6	Humbang Hasundutan	7.890	248	13.860	7.419	16.367
Sumatera Barat	7	Solok	7.723	740	13.007	18.132	32.445
	8	Sijunjung	4.533	837	4.101	5.152	14.441
	9	Tanah Datar	7.301	1.045	29.420	51	34.719
	10	Lima Puluh Kota	9.007	1.167	20.047	3.139	37.184
Lampung	11	Lampung Barat	19.935	1.100	8.773	2.724	11.081
	12	Tanggamus	9.467	679	18.681	10.678	21.397
	13	Pesawaran	7.065	850	12.674	6.864	20.153
Jawa Barat	14	Bogor	8.683	25.752	29.349	14.259	55.722
	15	Garut	4.961	2.506	2.868	14.653	81.146
	16	Tasikmalaya	14.679	75	31.060	26.951	82.928
	17	Kuningan	7.069	3.825	9.008	13.049	47.170
	18	Sumedang	6.240	300	9.739	4.685	58.340
Jawa Tengah	19	Wonosobo	5.728	750	7.081	13.969	14.323
	20	Magelang	10.162	7.190	22.567	13.095	38.523
	21	Klaten	11.258	1.890	22.827	9.101	61.149
	22	Wonogiri	7.582	5.350	9.380	19.404	59.853
	23	Blora	9.889	755	10.807	6.447	97.462
	24	Rembang	9.640	730	12.716	8.477	36.595
	25	Jepara	9.112	10.182	29.320	(1)	38.499
	26	Semarang	10.322	3.000	13.598	19.089	27.063
	27	Temanggung	5.589	2.189	7.774	9.937	12.677
	28	Batang	6.132	4.760	11.412	6.819	31.331
DIY	29	Sleman	7.286	5.323	15.554	10.260	24.328
Jawa Timur	30	Trenggalek	5.521	993	7.198	2.609	20.511
	31	Blitar	8.642	1.000	12.403	16.001	36.983
	32	Bondowoso	10.459	12.235	12.974	15.502	59.573
Kalimantan Barat	33	Landak	7.262	500	8.178	10.864	22.333
	34	Sanggau	19.240	1.569	9.013	586	16.139
Kalimantan Tengah	35	Barito Selatan	5.885	150	9.542	2.434	2.795
Kalimantan Selatan	36	Tanah Laut	39.834	238	6.545	10.095	24.649
	37	Tabalong	5.966	1.000	945	25.151	12.676
Kalimantan Timur		Kutai Barat	8.060	18	14.543	706	313
	39	Kutai Kartanegara	5.818	1.500	17.203	10.647	31.416
Sulawesi Selatan	40	Bantaeng	6.014	396	9.761	7.484	15.535
	41	Barru	4.700	630	4.902	6.874	22.723
	42	Tana Toraja	5.921	5.921	5.833	8.405	13.483
	43	Toraja Utara	39.834	25	10.129	-	21.529
TOTAL			483.045	110.028	554.280	402.984	1.320.021