The Correlation Analysis of Maintenance Costs to Sei Siulak Deras Irrigation Network Infrastructure Performance

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Research Paper

The Correlation Analysis of Maintenance Costs to Sei Siulak Deras Irrigation Network Infrastructure Performance

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Abstract
Sei Siulak Deras Irrigation Area is one of the Irrigation Areas located in Kerinci Regency based on the decision of Dinas Pekerjaan Umum dan Perumahan Rakyat (PUPR) regulations No.12/PRT/M/2015 concerning criteria and estabishment of Irrigation Area status with an area of 5,801 Ha. The authority for operational and maintenance implementation is handled by the Dinas PUPR of Jambi Province. The performance of the Sei Siulak Deras irrigation network infrastructure is inseparable from the available maintenance budget, for this reason, it is necessary to conduct a study that analyzes the relationship between routine maintenance costs for the performance of irrigation network infrastructure in the Sei Siulak Deras irrrigation area of Kerinci District, Jambi Province. In this study an examination of the existing conditions of irrigation networks involving 1 observer and 6 irrigation workers, the irrigation network inspection using the standards issued by the Operation and Maintenance Agency of the Dinas PUPR of Jambi Province. From the results of the correlation analysis the cost of routine maintenance on the performance of irrigation network infrastructure is 0.9, this indicates a strong relationship between the two variables. While the maintenance budget allocated by the government to the maintenance of irrigation network infrastructure is very lacking, amounting to IDR 806,081,000 from the budget for the maintenance of irrigation network infrastructure of IDR 3,580,984,372.57.

Keywords
correlation, maintenance cost, index perpormance

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1. INTRODUCTION

Jambi Province is one of the provinces in Indonesia which has launched a rice self-sufficiency program. To support this program, good irrigation infrastructure is certainly needed. One of the regencies in Jambi Province which has a strategic area in irrigation development is Kerinci Regency which is located at the western end of Jambi Province, with a position between 01°40' to 02°26' South Latitude and between 101°08' to 101°50' East Longitude, with wide area of 332.807 Ha atau 3.328,07 KM2. The existence of the Sei Irrigation Area. Siulak Deras with an area of 5,801 Ha, which is located in Kerinci Regency is be appointed based on Dinas Pekerjaan Umum dan Perumahan Rakyat (PUPR) regulation No.12/PRT/M/2015 concerning criteria and determination of Irrigation area status. While the authority over the implementation of operations and maintenance is handled by Dinas PUPR of Jambi Province (RTRW, 2013).

The performance of irrigation network infrastructure is inseparable from the operational costs and available maintenance costs, where this funding is budgeted in the State Budget Plan (RAPBN) and the implementation authority is handed over to the provincial government as stipulated in Government Regulation No. 20 of 2006. Funding for operations and maintenance is closely related to the ability of facilities and infrastructure to achieve high performance, so that limited funds can result in one or several activities not being able to be implemented, therefore managers must be able to choose the priority of operations and maintenance activities to be carried out. The fund arrangement for available operations and maintenance is regulated based on the Water Resources Act Number 7 of 2004 which consists of the government budget, private budget, and proceeds from the cost of water resources management. The operational and maintenance costs of this irrigation network include several aspects, ie the condition of physical infrastructure, planting productivity, supporting facilities, personnel organizations, documentation, and the condition of the Water User Farmers Association (P3A)services (Permen PUPR No. 12/PRT/M/2015). Several studies have been conducted about the operational and maintenance costs of irrigation networks, as well as the performance of irrigation

networks (Susanti, 2016; Sumaryanto, 2006; Sofyan, 2012).

Study on the magnitude of the relationship of maintenance costs to the performance of irrigation infrastructure needs to be done so that the relationship between maintenance costs and the performance of irrigation networks is obtained, especially routine maintenance that is directly used in daily activities during the operation and maintenance of irrigation networks. This research was conducted to analyze the relationship between the cost of routine maintenance to the performance of irrigation network infrastructure in the Siulak Deras Irrigation Area of Kerinci Regency, Jambi Province. So that the results of this study are expected to be used as a guideline for the government in the provision of the operating and maintenance budget for the irrigation network Sei Siulak Deras Irrigation Area.

2. EXPERIMENTAL SECTION

2.1 Classification method

In this study an examination of the existing conditions of Sei Siulak Deras irrigation network involving 1observer staff from the Dinas PUPR of Jambi Province in the field of Water Resources while 6 irrigation workers from the Irrigation field. The criteria for performance appraisal used in the inspection of irrigation networks use the standards issued by the Management and Maintenance Agency of the Dinas PUPR of Jambi Province. Inspection of irrigation networks is carried out through tracing irrigation networks to record irrigation network damage starting from the building to the canals by tracing irrigation structures and networks using GPS and metres. Secondary data used in this study include location maps, data on the condition of the irrigation network Sei Siulak Deras in the last 5 years, the amount of the operating and maintenance budget available, and other data related to research.

The study area in the Sei Siulak Deras Irrigation Area located in Kerinci Regency, Jambi Province, between 104°56'36" to 104°57'20" east longitude and 3°6'40" to 3°7'30" south latitude, with an area of 199 ha. The study area can be seen in Figure 1.

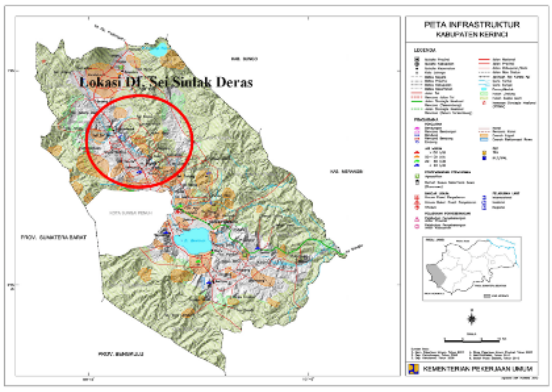

Figure 1. Study Area (Source : Dinas PUPR of Jambi Province)

2.2 Analysis method

Data processing is done using Ms. Excel to get a correlation between the cost of routine maintenance and the performance of irrigation network infrastructure. Furthermore, the comparison of operational funding requirements and routine maintenance of network infrastructure performance will be analyzed using an analysis of unit cost prices which refers to the analysis of unit prices issued by the Dinas PUPR of Jambi Province. Research Flow Chart can be seen in Figure 2.

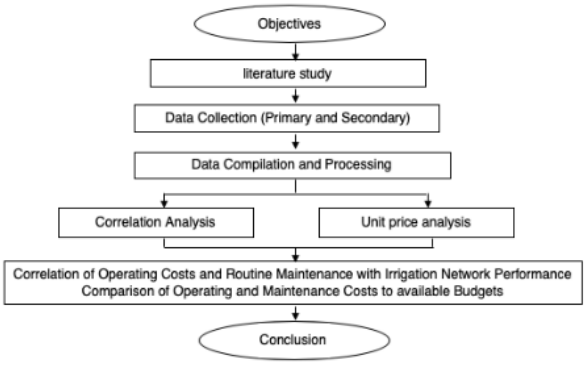

Figure 2. Diagram Alir

3. RESULTS AND DISCUSSION

3.1 Analysis of Physical Infrastructure Performance Index

The physical infrastructure performance index of the Sei. Seulak Deras irrigation area by using the criteria of the assessment of Management and Maintenance Agency of the Dinas PUPR of Jambi Province can be seen in Table 1.

Table 1 shows that the average performance index value of existing irrigation networks is below the optimum value, which is equal to 65.69%, in order to improve performance it must be maintained the performance of the irrigation physical network. Handling of maintenance must be pay attention to the priority of the maintenance based on the comparison between the existing performance index value and the optimum performance index value, so that handling of maintenance is on target. If seen from the biggest difference between the optimum performance value and the value of the existing performance, the priority for handling maintenance is "physical infrastructure", namely the difference of 8.74%.

3.2 Cost Analysis of Routine Maintenance

Based on the performance index of the inspection result of irrigation networks, the main priority in handling maintenance is on physical infrastructure, futhermore was done the calculation of the routine maintenance costs for the physical infrastructure of the irrigation network so the amount of routine maintenance costs needed for the physical infrastructure of the irrigation network Sei Siulak Deras was obtained. The calculation of the

Table 1. Sei Siulak Deras irrigation network physical performance index

No	Indicator	Performance Index (%)				Existing and Optimum Comparison
		Existing	Max	Min	Optimum	
1	Physical Infrastructure	26.26	45	25	35	8.74
2	Planting Productivity	12.78	15	10	12.5	0.28
3	Supporting facilities	3.55	10	5	7.5	3.95
4	Personnel Organization	12.1	15	7.5	10	2.1
5	Documentation	3.5	5	2.5	5	1.5
6	Water User Farmers Association (P3A)	7.5	10	5	7.5	0
	Irrigation Network Physical Performance Index	65.69	100	55	77.5	

Table 2. Budget plan for routine maintenance of physical infrastructure

No	Job Description	Cost (IDR)
1	Main Building	31,715,087.00
2	Carrier Channel	1,344,540,902.00
3	Building on the Carrier Channel	2,204,728,328.28
	Total	3,580,984,372.57

Table 3. The Routine Maintenance Budget of the last 5 years Sei Siulak Deras Irrigation Network can be seen in Table 3

No.	Years	Maintenance Costs of Irrigation Networks Sei Siulak Deras (IDR)
1	2014	725,121,000
2	2015	725,121,000
3	2016	978,991,000
4	2017	742,481,000
5	2018	806,081,000

(Source: Dinas PUPR of Jambi Province, 2019)

budget for work is carried out on 3 main buildings, namely the main building, the carrier channel, and building on the carrier channel. The results of the calculation of the routine maintenance costs in the irrigation network Sei Siulak Deras, can be seen in Table 2.

Table 2 shows that the largest infrastructure maintenance costs are in the carrier channel, which is equal to IDR 2,204,728,328.28 or about 62% of the total maintenance budget, which is IDR 3,580,984,372.57.

3.3 Available Budget Allocation of Funds

The routine maintenance of the Sei Irrigation Network Sei Siulak Deras is charged in the State Revenue and Expenditure Budget (APBN) every year. The amount of the routine maintenance budget in the last 5 years can be seen in Table 3.

Table 3 shows that the government budget for the maintenance and operation of the Sei Siulak Deras irrigation network. Sei Siulak Deras averages under IDR 1,000,000,000 annually, while the budget needed for routine maintenance is IDR 3,580,984,372.57.

3.4 Analysis of Maintenance Cost Correlation on Network Infrastructure Performance

From the irrigation network performance index value, maintenance budget, and available fund allocation, it can be seen that the budget provided is still far from the funds needed for routine maintenance of Sei Siulak Deras irrigation network infrastructure, so that it is not possible to maintenance maximum. Maintenance that is not optimal can certainly cause a decrease in the performance of existing irrigation infrastructure. The performance index of Sei Siulak Deras irrigation channel in 2014 to 2017 is as follows: 31.00; 31.20; 24.10; 30.40 (PUPR, 2019), while the value of the irrigation performance index in 2018 is obtained from the results of examination which is equal to 26.26. From the results of the correlation analysis calculations using Ms. Excel was obtained a correlation value of 0.9, this indicates that there is a strong relationship between maintenance costs to the performance of Sei Siulak Deras irrigation network infrastructure. The higher the correlation value, the stronger relationship between the two variables.

3.5 Discussion

Damage to irrigation canals is caused by several factors, such as the presence of sediment, garbage, or the age of channels. However, maintenance efforts carried out by the government are still insufficient, this is evidenced by the lack of maintenance costs budgeted by the government for the maintenance of irrigation networks, especially the irrigation network Sei Siulak Deras. This of course must be a top priority for the government in setting maintenance budgets, especially routine maintenance of irrigation network infrastructure by considering the budget needs of the irrigation network maintenance itself, because there is a strong relationship between maintenance costs and irrigation network infrastructure performance.

4. CONCLUSIONS

The correlation analysis results of routine maintenance costs for the performance of irrigation network infrastructure was

0.9, this indicates that there is a strong relationship between the two variables. While the maintenance budget allocated by the government to the maintenance of irrigation network infrastructure is very lacking, namely as much as IDR 806,081,000 from the total budget for the maintenance of irrigation network infrastructure of IDR 3,580,984,372.57.

5. ACKNOWLEDGEMENT

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