PERFORMANCE EVALUATION OF SECONDARY CANAL SYSTEM OF WAY PAMALI IRRIGATION AREA IN BURU DISTRICT, MALUKU PROVINCE

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Abstract- Performance is one of the descriptions of the level of achievement of the implementation of an activity program or policy in realizing the target. The purpose of this research is to obtain the physical condition of the building, the performance of the building function and the maintenance cost of the secondary channel building of the Way Pamali irrigation area of Buru Regency. Based on this research, it can be concluded that in general the physical condition of the channel and the function of the irrigation channel of the Way Pamali irrigation area is generally still good to drain the flow of water to the rice fields. Assessment of the performance index of the physical infrastructure of the carrier channel using the Regulation of the Minister of PUPR Number 12 / PRT / 2015 concerning Exploitation and Maintenance of Irrigation Networks, obtaining an assessment result of 58.90% on the Ba.Ki.4 section and obtaining an assessment result of 56.68% on the Ba.Ki section and the calculation of the budget plan for the cost of secondary irrigation channels with a length of 1,033 meters that are damaged with a large repair cost budget of Rp. 2,486,700,000.00, - (Two Billion Four Hundred Eighty Six Million Seven Hundred Thousand Rupiah).

***Index* Terms- Damage, Performance, Repair, Cost Budget Plan.**

I. INTRODUCTION

According to Moeheriono (2012), performance is a description of the level of achievement of the implementation of an activity program or policy in realizing the goals, objectives, vision, and mission of the organization as outlined in an organization's strategic planning. Irrigation networks according to the Regulation of the Minister of Public Works and Public Housing of the Republic of Indonesia Number 12/PRT/M/2015 are channels, buildings, and their complementary buildings which are a single unit required for the provision, distribution, provision, use, and disposal of irrigation water.

Irrigation is a means of utilizing water resources that has a function as a provider, regulator and distributor of water to support agricultural land, especially in the dry season. Irrigation is organized with the aim of realizing comprehensive, integrated, and environmentally sound water benefits. One of the problems that commonly occur in the irrigation sector is the problem of water distribution, this problem can be caused by water discharge factors that are not suitable for irrigation of irrigation areas which can be caused by small upstream discharge or caused by technical factors in the field such as the physical infrastructure of irrigation problems that can hinder the performance of the irrigation itself.

Way Pamali Irrigation Area is located in Buru Regency, Maluku Province which was built in 2003 which is approximately 19 years old with a secondary channel length of 4.529 Km and a functional area of 942.9 Ha with trapezoidal channel dimensions, namely the bottom width of the channel 1.60 m, the top width of the channel 3.60 meters and channel height 1.00 meters.

An efficient and effective irrigation management system greatly affects the maximum yield of agricultural production in the context of national food security. In maintaining optimal irrigation water, of course, good maintenance effort management is needed, maintenance efforts and assessment of the irrigation area must always be improved and supervised in its operation. Currently the Secondary channel of Way Pamali irrigation area that has been built is inadequate in its service, and also the way apu dam construction program, it is necessary to rehabilitate the Way Pamali Irrigation Area. Problems with the physical infrastructure, of course, can cause the irrigation function to be ineffective and efficient and not as expected due to a decrease in the quality of the physical infrastructure. It should be noted, irrigation physical infrastructure certainly has a very vital role in the irrigation sector itself. Therefore, by evaluating the maintenance of the physical infrastructure of this irrigation area, the condition and function of each existing physical infrastructure can be known so that maintenance can be carried out to maintain the function of the water network in an irrigation area to remain optimal.

Assessment of irrigation networks is needed to determine the condition of the irrigation network, whether it is still functioning properly or in a condition that needs special handling in carrying out its function for water distribution.

The government has regulated the assessment system and weighting of irrigation networks as outlined in the PUPR Ministerial Regulation No. 12 / PRT / 2015 concerning Exploitation and Maintenance of Irrigation Networks components that need to be assessed in connection with the assessment of the irrigation network system, namely Physical Infrastructure.

Based on the above, the author took research on Performance Evaluation of Secondary Channel System of Way Pamali Irrigation Area, Buru Regency, Maluku Province.

The purpose of this research is to obtain the physical condition of the building, the performance of the building function and the maintenance cost of the secondary channel building of Way Pamali irrigation area of Buru Regency.

II. METHODS

Research Location

The location of this research is in the secondary channel of the pamali way irrigation area, buru district, maluku province.

Image 1 Secondary Channel Network of Way Pamali Irrigation Area, Buru Regency

Types of Data

The data obtained as a reference for this research are as follows:

a. Primary Data
   Primary data is data obtained through surveys in the field, in the secondary channel area of the pamali way irrigation area consisting of channel conditions and discharge measurement data.
b. Secondary Data
   Secondary data is obtained by coordinating with related parties, namely from the Maluku river basin consisting of technical data and building schemes to the secondary network.

Data Collection Technique

To obtain data that is in accordance with the problem under study or will be discussed, the researcher uses the following data collection techniques:

a. Field survey to assess all physical infrastructure and functionality of secondary channels in the pamali way irrigation area.
b. Secondary data collection was obtained through coordination with the Maluku River Basin.
c. Literature study by conducting a study of books, literature that has to do with evaluating the performance of Way Pamali secondary channels.

Analysis Methods

a. Irrigation Network Inventory
b. Recapitulation of Performance Value Index Assessment
c. Final Performance Value Index Assessment

Research Diagram

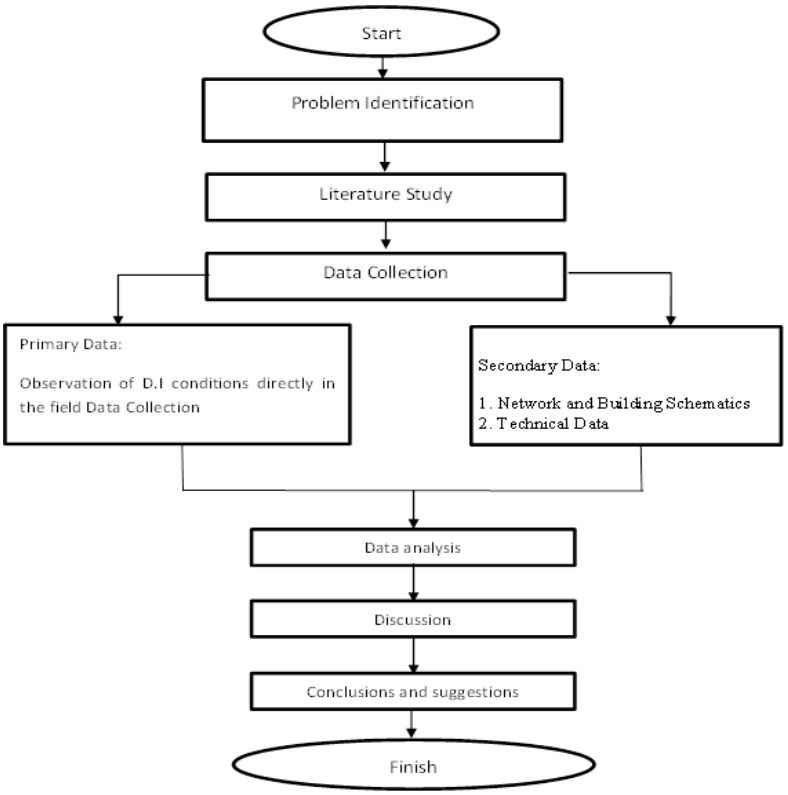

Image 2 Research Flow Chart

III. ANALYSIS AND DISCUSSION

Physical Condition of Way Pamtnagali Irrigation Area Channels

Inventory of irrigation networks is intended to determine the type, number, and location of buildings and their performance. This is intended to determine the amount and percentage of damage to the irrigation area, especially with the method of measurement and documentation using a camera. This work includes an assessment of the performance of irrigation infrastructure which includes Physical Infrastructure. For the condition and function of the pamali way irrigation area network is generally good, but there are several things that reduce the performance of the channel such as overgrown channels, several points of the channel experiencing damage / cracks and faults.

Calculation of Secondary Channel Debit of Way Pamali Irrigation Area

Calculating a discharge on an irrigation canal, we must know in advance, the speed of the flow. To get a speed by using the buoy and stopwatch method, where the buoy is released on the primary channel from point A to point B with a certain distance, then use a stopwatch to calculate the speed of the float from point A to point B. Because the formula for finding discharge is the density multiplied (x) by the wet cross section of the channel. So to find a discharge, wet channel data is needed, so the author calculates the channel discharge only on the damaged channel in the left section (BA.Ki) 4 and left section (BA.Ki) 6.

From the results of the calculation of discharge in the Way Pamali Irrigation Area in the secondary channel on the left Section (BA.Ki) 4, Q obtained 0.721 m3 / sec and Q plan 1.287 m3 / sec. The current Q does not meet the Q plan while in the secondary channel on the left section (BA.Ki) 6, the Q obtained is 0.257 m3/det and the Q plan is 1.119 m3/det. The current Q does not meet the Q plan.

Criteria and Weighting of Secondary Channel Function and Condition Assessment

Assessment of the weight of the function and condition of the Secondary Channel is carried out based on the Regulation of the Minister of Public Works and Public Housing Number 12/PRT/M/2015 concerning Exploitation and Maintenance of Irrigation Networks which has been translated into the Irrigation System Performance Index (IKSI) method.

The results of the assessment of the weight of the function and condition of the Secondary Channel in the Way Pamali Secondary Channel Left Section (BA.Ki) 4 with the following description:

a. The capacity of each channel is sufficient to carry the maximum discharge needs / plan (Secondary)
   1. Poor condition (<60)% where the profile of each section changes and the capacity is reduced by more than 40% of the planned capacity, it can be categorized as a damaged condition, if the condition is <60% of the initial condition of the building / channel and heavy repair or replacement is required.

2. Moderate condition (60 - < 80)% where there are several illegal taps and leaks that affect the channel capacity. Efficiency is between 60%-70%. There is one illegal take for every 100 m of channel length Medium condition, if the condition is 60 - < 80% of the initial condition of the building / channel and maintenance is required that is repair.
3. Good condition (80 - < 90)% where erosion deposits have a lot of effect on channel capacity 20% - 40% of the planned channel capacity Good condition, if the condition is 80 - < 90% of the initial condition of the building / channel and periodic maintenance is required in the nature of maintenance.

b. The capacity of each Channel is sufficient to carry the maximum required/planned discharge.
1. Excellent Condition (90 - 100)% The embankment has good stability, a safe guard height to prevent overtopping during the operating period and the rainy season (remaining guard height) of earthen channels > 30 cm. Pair channels > 20 cm, if the condition is 80 - < 90% of the initial condition of the building / channel and periodic maintenance is required which is maintenance.
2. Good condition (80 - < 90)% where the slope/wall of the outer and / or inner embankment has landslides and wild plants, if the condition is 80 - < 90 % of the initial condition of the building / channel and periodic maintenance is required maintenance.

c. Implementation of Channel Repair and/or Maintenance has been completed
Poor Condition (<60) % where Repair of channels in poor and moderate conditions that can be completed this year has not reached <60%, if the condition is <60% of the initial condition of the building/canal and heavy repair or replacement is required.

The results of the assessment of the weight of the function and condition of the Secondary Channel in the Way Pamali Secondary Channel Left Section (BA.Ki) 6 with the following description:

a. The capacity of each channel is sufficient to carry the maximum demand / plan discharge (Secondary)
1. Poor condition (<60)% where the profile of each section changes and the capacity is reduced by more than 40% of the planned capacity, it can be categorized as a damaged condition, if the condition is <60% of the initial condition of the building / channel and heavy repair or replacement is required.
2. Moderate condition (60 - < 80)% where there are several illegal taps and leaks that affect the channel capacity. Efficiency is between 60%-70%. There is one illegal take for every 100 m of channel length Medium condition, if the condition is 60 - < 80% of the initial condition of the building / channel and maintenance is required that is repair.
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2. Good condition (80 - < 90)% where the slope/wall of the outer and / or inner embankment has landslides and wild plants, if the condition is 80 - < 90 % of the initial condition of the building / channel and periodic maintenance is required maintenance.

c. Implementation of Channel Repair and or /Maintenance has been completed
Poor Condition (<60)% where Repair of canals in poor and moderate condition that can be completed this year has not reached <60%, if the condition is <60% of the initial condition of the building/canal and heavy repair or replacement is required.

Secondary Channel Performance of Way Pamali Irrigation Area

a. Secondary Channel Performance Index Assessment Left Section (BA.Ki) 4
From the results of the Secondary network performance index assessment, a performance index value of 5.89% of the maximum 10% assessment weight has been determined in the IKSI method.
Based on the graph above, it can be seen that the x-axis is the Secondary channel component and the y-axis is the performance index (%) where the percentage of the secondary channel performance index is at 58.90%, the index value can be categorized that the Secondary channel is in poor condition. This condition requires heavy repair or replacement of damaged secondary channels.

b. Secondary Channel Performance Index Assessment Left Section (BA.Ki) 6
From the results of the Secondary network performance index assessment, a performance index value of 5.66% of the maximum 10% assessment weight has been determined in the IKSI method.
Based on the graph above, it can be seen that the x-axis is the Secondary channel component and the y-axis is the performance index (%) where the percentage of the secondary channel performance index is at 56.68%, the index value can be categorized that the Secondary channel is in poor condition. This condition requires heavy repair or replacement of damaged Secondary channels.

Calculation of RAB (Budget Plan)

Based on volume calculations with unit price analysis, the cost budget plan for the work of the Way Pamali Secondary Irrigation Channel in Lolongguba District, Buru Regency is obtained as follows:

Table 1 Calculation of RAB (Budget Plan)

ENGINEERING ESTIMATE					
Job : Way Pamali Secondary Irrigation Canal					
Job Location : Lolongguba Sub-district, Buru Regency					
No	**Work item**	**Unit**	**Volume**	**Unit Price**	**Total Price**
1	Concrete quality, f'c = 19,3 MPa (K225), slump (12±2) cm, w/c = 0,58	M3	456,58	1.994.720,35	910.749.417,40
2	Backfill of imported borrow area	M3	4132	312.497,81	449.996.840,93
3	Striping/scraping	M2	3099	7.935,00	3.547.738,50
4	Excavation	M3	181,8	75.456,75	202.420.277,55
			A	Total Amount	2.240.298.954,77
			B	Contingency (11%) x A	246.432.885,02
			C	Total A+B	2.486.700.839,79
			D	Rounded	2.486.700.000,00
Named		Two Billion Four Hundred Eighty Six Million Seven Hundred Thousand Rupiahs			

IV. CLOSING

Conclusion

In general, the physical condition of the channel and the function of the irrigation canal of Way Pamali irrigation area is generally still good to drain the flow of water to the rice fields. Assessment of the performance index of the physical infrastructure of the carrier channel using the Regulation of the Minister of PUPR Number 12 / PRT / 2015 concerning Exploitation and Maintenance of Irrigation Networks, obtained an assessment result of 58.90% on the Ba.Ki.4 section and obtained an assessment result of 56.68% on the Ba.Ki section and the calculation of the budget plan for the cost of secondary irrigation channels with a length of 1,033 meters that are damaged by swallowing the repair cost budget of Rp. 2,486,700,000, - (Two Billion Four Hundred Eighty Six Million Seven Hundred Thousand Rupiah).

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