PERFORMANCE ANALYSIS OF USAU BATANG TIMPEH IRRIGATION NETWORK MANAGEMENT IN DHARMASRAYA DISTRICT

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Abstract: Irrigation has a huge impact on meeting water needs for rice fields. Good irrigation needs to pay attention to irrigation management so that it can meet the water needs of the population's rice fields. In this research, the assessment of irrigation management performance is based on five variables, namely physical infrastructure, documentation, personnel, water user farmer associations, and planting productivity. Data collection was carried out by giving questionnaires to water managers and users and the results showed that the irrigation management performance of the Batang Timpeh Usau Irrigation Area was in very poor condition. This condition has an impact on the lack of harvest yields, the lack of farming per year, and the quality of the rice produced being less than optimal. Some improvement efforts that can be carried out include rehabilitating weir buildings, cleaning irrigation channels, assigning special personnel to manage irrigation networks, and providing outreach to the community.
Keywords: *performance analysis, irrigation, dams, Dharmasraya*

A. Introduction

In Indonesia in general and West Sumatra in particular, the staple food of the people is rice. Rice is produced from rice planted in rice fields and for its growth this rice requires quite a lot of water, this water can come from irrigation water. Irrigation activities include managing water from the source, managing water, distributing water, and distributing water to agricultural land that needs it to support the growth and yield of agricultural crops. To get good results, water must be in the right quantity and right quality at the rice growth stage so good management is needed.

Dharmasraya Regency is located in West Sumatra Province which is one of the autonomous regions resulting from the expansion of Sawahlunto/Sijunjung Regency which was inaugurated on January 7 2004 by the President of the Republic of Indonesia symbolically at the state palace. Formed based on Law Number 38 of 2003 dated 18 December 2003 concerning the Establishment of Dharmasraya Regency, South Solok Regency and West Pasaman Regency in West Sumatra Province. Rice is one of the leading regional commodities that has been determined by the Dharmasraya Regency Government. Reporting from data from the West Sumatra Province Central Statistics Agency for 2022, rice production from Dharmasraya Regency was 25,537.80 tons, a decrease compared to the previous year, namely 37,068.00 tons. In this case, there are many factors that can influence the harvest results of an area, one of which is the lack of a good irrigation system. The irrigation system functions to regulate water, both to bring in the water needed for plant life and to remove excess water for plants, maintaining and increasing soil fertility. By looking at the function of the irrigation system which can maintain and increase soil fertility, irrigated rice fields will provide a higher level of productivity when compared to rain-fed rice fields.

One of the irrigation systems in Dharmasraya Regency is the Batang Timpeh Usau irrigation system. The Batang Timpeh Usau irrigation system originates from the Batang Timpeh Usau river which is in the Timpeh subdistrict. This river, which is 25.00 km long, is a source of irrigation for the people of Nagari Timpeh. Nagari Timpeh is one of the nagari in Dharmasraya Regency with an area of 323.01 km2 with a population of 14,836 people in 4050 families (KK). 3 Of the 4050 families, there are those who use the river as a source of water for daily needs. -days in households of 106 families. 4 Apart from being a source of drinking water, Batang Timpeh irrigation is also used to irrigate 114 Ha of productive rice fields.

Based on field observations and interviews with local communities, the problem that often occurs in Batang Timpeh Usau irrigation is the reduction in water discharge in the irrigation network due to sedimentation and other disturbing plants along the irrigation network, so that some agricultural land experiences water supply disruption, as a result farmers are farming is hampered. Meanwhile, the farming community in Nagari Timpeh is very dependent on the Batang Timpeh Usau irrigation network. So the management of the Batang Timpeh Usau irrigation network needs to be improved to support community activities in the nagari. Management must continue to be evaluated to ensure that the management is appropriate and beneficial to the community, because irrigation as one of the supporting components for successful agricultural development has a very important role. The provision of irrigation water for agriculture needs to be managed wisely and sustainably so that its existence and function are better maintained. Management, including utilization, must be carried out fairly and evenly so that it can provide benefits in the agricultural sector.

B. Methods

This research uses a quantitative approach and in carrying out this research direct observations were made at the location to see the physical condition of the irrigation buildings and a questionnaire was taken to determine the performance achievements of irrigation management which is the first aim of this research. Next, a questionnaire was calculated for each research variable to analyze the obstacles and impacts of poor irrigation management, this was the second aim of the research. After that, from the results of irrigation management performance achievements and their impacts, improvement efforts can be formulated so that the condition of the Batang Timpeh Usau irrigation network can be better and support rice production in Kenagarian Timpeh, Dharmasraya Regency. Based on the problem formulation and research objectives to be achieved, the research stages can be summarized in the form of a research methodology flow diagram presented in Figure 1.

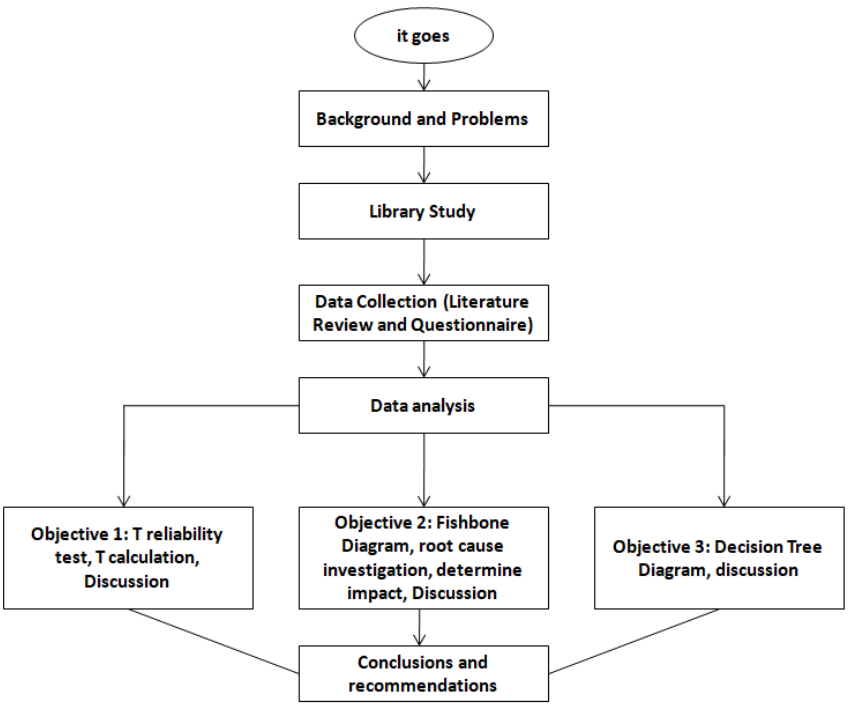

Figure 1. Research Stages

C. Results and Discussion

Data collection

The research analysis stage begins with tabulating data on the answers to the questionnaire distributed to respondents. In this study, a sample of 100 people was taken who were considered to represent the population of water managers and users of the Batang Timpeh Usau irrigation area, Dharmasraya Regency in Kenagarian Timpeh. The number of questionnaires distributed was 100 questionnaires and all respondents provided answers so that all questionnaires were returned to the researchers to continue the analysis after testing validity and reliability testing.

Validity test

A significance level of 5% was used because it used a sample size of 100 people. So that the validity test results of each variable are obtained, namely in Table 1.

Tabel 1. Hasil Uji Validitas

Factor	Code Variable	r count	r table (5%)	Information
Physical Infrastructure	X1.1	0,794	0,195	Valid
	X1.2	0,725	0,195	Valid
	X1.3	0,816	0,195	Valid
	X1.4	0,728	0,195	Valid
	X1.5	0,624	0,195	Valid
	X1.6	0,815	0,195	Valid
	X1.7	0,839	0,195	Valid
	X1.8	0,519	0,195	Valid
	X1.9	0,611	0,195	Valid
	X1.10	0,614	0,195	Valid
	X1.11	0,805	0,195	Valid
	X1.12	0,841	0,195	Valid
	X1.13	0,841	0,195	Valid
Personnel Organization	X2.1	0,699	0,195	Valid
	X2.2	0,718	0,195	Valid
	X2.3	0,675	0,195	Valid
	X2.4	0,773	0,195	Valid
	X2.5	0,792	0,195	Valid
	X2.6	0,744	0,195	Valid
	X2.7	0,774	0,195	Valid
	X2.8	0,705	0,195	Valid
Documentation	X3.1	0,872	0,195	Valid
	X3.2	0,917	0,195	Valid
	X3.3	0,872	0,195	Valid
Supporting facilities	X4.1	0,843	0,195	Valid
	X4.2	0,860	0,195	Valid
	X4.3	0,641	0,195	Valid
	X4.4	0.626	0,195	Valid
Water User Farmers Association (P3A)	X5.1	0,521	0,195	Valid
	X5.2	0,523	0,195	Valid
	X5.3	0,718	0,195	Valid
	X5.4	0,772	0,195	Valid
	X5.5	0,425	0,195	Valid
	X5.6	0,643	0,195	Valid
	X5.7	0,577	0,195	Valid

Reliability Test

The results of the reliability test are as follows:

Table 2. Cronbasch's Alpha Result

Variable	Cronbasch's Alpha
Physical Infrastructure	0,770
Personnel Organization	0,776
Documentation	0,859
Supporting facilities	0,827
Water User Farmers Association (P3A)	0,859

First Goal of Research

The first objective of this research is to analyze the management performance of the Batang Timpeh Usau irrigation network. Performance is related to the irrigation's ability to meet the water needs of the beneficial users of the irrigation network. Based on research results, it shows that lowland rice does not require abundant water, excess water from irrigation water management can be used for other purposes such as increasing planting intensity, expanding planting areas and reducing fallowing, especially in the dry season. Apart from field observations, TCR (Total Achievement of Respondents) was also calculated to assess the performance of Batang Timpeh Usau irrigation management. The TCR value is obtained from the total value of the respondent's answers divided by the total maximum value of the answer.

For example, for respondent number 1, the total answer score for the 38 questionnaire questions was 86 (Rs). Because this questionnaire uses a Likert scale, where the weight of the questions is 1 to 5, so the minimum answer score is 1 and the maximum answer score is 5. So the maximum answer score is obtained from the maximum score multiplied by the number of questionnaire questions, so that the maximum answer score is obtained. is 5 x 38 = 190 (N). So the Total Respondent Achievement (TCR) value for respondent number 1 is 45.26%, and a similar calculation was also carried out for the next respondent. So, from the results of the tabulation of questionnaire data as in Appendix 6, the calculation of the TCR value or respondent achievement level for 100 respondents is as shown in Table 3.

Table 3. TCR calculation results

Respondents' No	Total Score of Respondents' Answers	TCR	Respondents' No	Total Score of Respondents' Answers	TCR
1	86	45.26%	51	104	54.74%
2	76	40.00%	52	103	54.21%
3	88	46.32%	53	108	56.84%
4	80	42.11%	54	111	58.42%
5	82	43.16%	55	102	53.68%
6	87	45.79%	56	111	58.42%
7	86	45.26%	57	101	53.16%
8	84	44.21%	58	107	56.32%
9	79	41.58%	59	106	55.79%
10	87	45.79%	60	105	55.26%
11	77	40.53%	61	97	51.05%
12	75	39.47%	62	126	66.32%
13	77	40.53%	63	129	67.89%

14	77	40.53%	64	118	62.11%
15	81	42.63%	65	105	55.26%
16	81	42.63%	66	92	48.42%
17	89	46.84%	67	123	64.74%
18	85	44.74%	68	116	61.05%
19	81	42.63%	69	97	51.05%
20	99	52.11%	70	93	48.95%
21	99	52.11%	71	101	53.16%
22	95	50.00%	72	99	52.11%
23	107	56.32%	73	95	50.00%
24	92	48.42%	74	91	47.89%
25	95	50.00%	75	109	57.37%
26	91	47.89%	76	98	51.58%
27	98	51.58%	77	93	48.95%
28	102	53.68%	78	102	53.68%
29	87	45.79%	79	88	46.32%
30	101	53.16%	80	108	56.84%
31	90	47.37%	81	99	52.11%
32	93	48.95%	82	95	50.00%
33	94	49.47%	83	107	56.32%
34	93	48.95%	84	130	68.42%
35	93	48.95%	85	119	62.63%
36	102	53.68%	86	127	66.84%
37	96	50.53%	87	102	53.68%
38	96	50.53%	88	115	60.53%
39	103	54.21%	89	111	58.42%
40	104	54.74%	90	120	63.16%
41	104	54.74%	91	120	63.16%
42	93	48.95%	92	120	63.16%
43	97	51.05%	93	124	65.26%
44	114	60.00%	94	129	67.89%
45	107	56.32%	95	128	67.37%
46	111	58.42%	96	142	74.74%
47	98	51.58%	97	121	63.68%
48	99	52.11%	98	132	69.47%
49	95	50.00%	99	137	72.11%
50	94	49.47%	100	143	75.26%

Table 3 is a calculation table for 100 samples. After the calculations were carried out, the average TCR for all factors was 53.47%. The TCR results for each factor can be seen in Table 4.

Table 4. Average Value of TCR of Each Factor

No	Factor	Average TCR Value
1	Physical Infrastructure	52,01 %
2	Personnel Organization	53,55 %
3	Documentation	51,93 %
4	Supporting facilities	53,65 %
5	Water User Farmers Association (P3A)	54,23 %

From these results it can be seen that there are 5 irrigation management performance factors in the very poor category, namely physical infrastructure, personnel organization, documentation, supporting facilities and the Water User Farmers Association (P3A).

Second Research Objective

The second objective of this research is to analyze the impact of poor management of the Batang Timpeh Usau irrigation network on rice production. To get the results of this second objective, analysis was carried out using a fishbone diagram. Through the Fishbone diagram, you will identify various potential causes of an effect or problem, and analyze the problem through a brainstorming session. In accordance with the second aim of the research to see the impact of irrigation on plant productivity, especially rice, the fishbone diagram can be seen in Figure 2

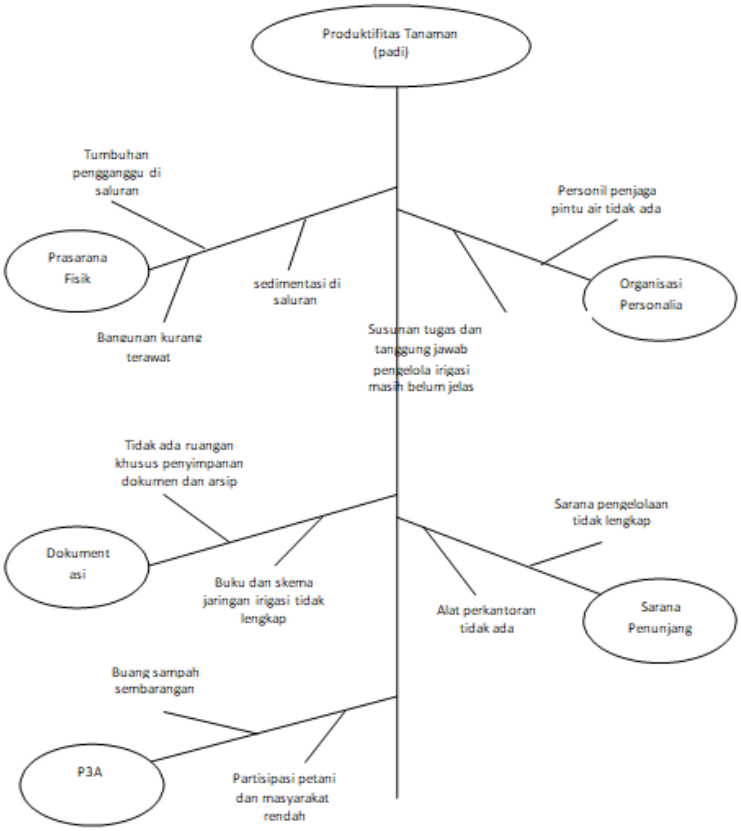

Figure 2. Fishbone Diagram

Third Research Objective

The third objective of this research is to find efforts that can be made in the Batang Timpeh Usau irrigation network so that water needs can be met. According to the TCR results the Batang Timpeh Usau irrigation system is in the bad category. The condition of an irrigation system with damaged physical infrastructure will certainly cause the irrigation system to not function optimally. Apart from that, the improvement efforts carried out aim to improve the management performance of the Timpeh Usau trunk irrigation network so that it can meet the community's water needs so that planting productivity can be increased. Improvements require cooperation from all parties related to this irrigation, starting from the relevant agencies responsible for managing the Batang Timpeh Usau irrigation, as well as farmers and communities who use the Batang Timpeh Usau irrigation as their water source. These improvement efforts should be carried out regularly and systematically so that the water needs of farmers and the community can be met.

Research Validity

1. To support the validity of the data in this research, for the first aim of the research, measuring tools such as cameras and smartphones were used for documentation in taking conditions when collecting data in the form of field visits.
2. For the second aim of the research, measuring instruments such as cameras and smartphones were used to document taking questionnaires from respondents and to carry out validity and reliability tests using the SPSS application to support the validity of the research data.
3. For the validity of the second and third research objectives, interviews were conducted with experts in the field of irrigation. In the interview contained in Appendix II it can be concluded as follows:
   a) All items in the instrument are relevant to the current conditions of the Batang Timpeh Usau irrigation network.
   b) Overall, all variables are in accordance with the research objectives.
   c) All causes and solutions or improvements that can be made to improve the performance of the irrigation network to meet the water needs of the community and farmers have been examined by experts and declared appropriate.
   d) At a very bad level of damage, there are several impacts felt by the community, such as: a lack of planting capacity per year, the quality of rice decreases due to lack of water, the number of harvests decreases, and farming schedules are disrupted.

D. Conclusions

Based on the research results, conclusions can be drawn:

1. The performance of the Batang Timpeh Usau irrigation network is influenced by several variables, including: physical infrastructure, personnel, documentation, farmers who use water, and planting productivity. From the results of calculating the Total Respondent Achievement (TCR), it was found that the performance of the Batang Timpeh Usau irrigation network was 53.47%, which was in very poor condition.
2. From several research factors examined, the impacts arising from very poor irrigation management include: water flow being disrupted or even blocked, unequal distribution of water, slow service if there is damage to the irrigation network, and damage to irrigation facilities and infrastructure. All of this has an impact on rice productivity, starting from decreasing harvest yields, decreasing the number of planting crops per year to the poor quality of the rice produced.
3. Efforts that can be made to improve the performance of the irrigation system so that it can meet the community's water supply needs include: carrying out rehabilitation and maintenance on irrigation buildings, cleaning irrigation channels from sediment and nuisance plants, assigning special personnel to manage irrigation networks, providing better management. clear, and carry out outreach to the community and farmers who use water to be able to maintain irrigation network facilities and infrastructure.

References

[31] Azis, Subandiyah, 2011, Analysis of Irrigation Water Requirement for Anticipating Global Climate Change, Article No. JBASR-450-8, Journal of Basic and Applied Scientific Research.
[32] Badan Pusat Statistik Kabupaten Dharmasraya, 2022, Kecamatan Timpeh Dalam Angka
[33] Bernardin, O., dan Russel, D., 2016, Perilaku Organisasi Terjemahan Jilid 3, Yogyakarta: Andi Offset.
[34] Direktorat Bina Operasi dan Pemeliharaan Kementerian Pekerjaan Umum dan Perumahan Rakyat,2019, Modul Operasi dan Pemeliharaan Jaringan Irigasi. Jakarta
[35] Dirjen bina operasi dan pemeliharaan, 2019, Modul pengembangan dan pengelolaan sistem irigas partisipatif, Jakarta

[36] Frandatoni, Noval, 2019, Kajian Dampak Kinerja Sistem Irigasi Berdasarkan Kondisi Sarana dan Prasarana Daerah Irigasi Siulak Deras Kabupaten Kerinci, Universitas Bung Hatta Padang
[37] Hair, J.F., Blak, w.C., Babin, B.J. and Anderson, R.E, 2010, Multivariate Data Analysis. 7th Edition, Pearson, New York.
[38] Lalan, Helny, 2017, Pelacakan iklim dan pengaruhnya Terhadap Pelaksanaan Pembangunan Irigasi di Kabupaten Dharmasraya, Prosiding 4th Andalas Civil Engineering (ACE) Cpnference 2017, 9 November 2017, Universitas Andalas : Padang
[39] Mahananto, dkk, 2009, Faktor-faktor yang mempengaruhi produksi padi (studi kasus di kecamatan nogosari, boyolali, jawa tengah), WACANA Vol. 12 No.1 Januari 2009 ISSN. 1411-0199 Hal. 179-191
[40] Nasrul, dkk, 2015, Evaluasi Kinerja Operasi dan Pemeliharaan Jaringan Irigasi Pada Daerah Irigasi Batang Hari Di Kabupaten Dharmasraya, Prosiding 2nd Andalas Civil Engineering Conference : Padang 13 Agustus 2015.
[41] Pratimi, Natalia, 2019, Analisis Faktor Penyebab Rendahnya Kinerja Jaringan Irigasi Air Santok Kota Pariaman, Universitas Bung Hatta: Padang
[42] Nurrochmad, Fathan, 2007, Analisis Kinerja Jaringan Irigasi, AGRITECH, Vol.27, No. 4 Desember 2007 Hal. 182-190
[43] Pemerintah Kabupaten Dharmasraya, 2015, Buku data Status Lingkungan Hidup Daerah Kabupaten Dharmasraya Tahun 2015 : Pulau Punjung.
[44] Pemerintah Kabupaten Dharmasraya, 2016, Rencana Kerja Kabupaten Dharmasraya Tahun 2015 : Pulau Punjung.
[45] Purbawa, Gede Bani, dkk,2022, Analisis Kinerja Jaringan Irigasi Daerah Irigasi Padang Keling Berbasis Epaksi Di Kabupaten Buleleng, ENMAP Vol.3 No. 1 Maret 2022
[46] Pusdiklat Sumber Daya Air dan Kontruksi, 2017, Modul Pemeliharaan Jaringan Irigasi, Bandung : Badan Pengembangan Sumber Daya Manusia.
[47] Rani, hafnidar a., 2016, Manajemen Proyek Konstruksi. Ed.1, Cet. 1, Yogyakarta: Deepublish
[48] Simanjuntak, 2015, Manajemen Dan Evaluasi Kinerja, Jakarta: Fakultas Ekonomi Universitas Indonesia.
[49] Wilhelmus, ludiana, dkk, 2015, Evaluasi Kinerja Jaringan Irigasi Bendungan Tilong Kecamatan Kupang Tengah Kabupaten Kupang, Jurnal Teknik Sipil Vol. IV, No. 1, April 2015 Hal.15-28