

# The Performance Evaluation of the Irrigation System in the Sausu Irrigation Area Parigi Moutong Regency

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## **Abstract**

Damage to the infrastructure and facilities of the irrigation system reduce the performance of the irrigation management system. Decline in irrigation system performance affects the availability of water requirements or rice crops in the fields per unit area. This study was conducted to assess the performance of the main irrigation system in the sasusu irrigation area. According to the Ministry of Public Works and Public Housing Regulation Number 12/PRT/M/2015 of 2015, using the Irrigation System Performance Index. The evaluation results for the main irrigation system show a value of 75.13% out of the maximum value of 100%. This result aligns with the standard in Permen PUPR No. 12/PRT/M/2015, which has a performance range of 70–79, categorized as good performance. The maintenance required for irrigation systems in the good category includes routine and periodic maintenance. Efforts to improve the performance of the main irrigation system in the Sausu Irrigation Area include addressing various supporting aspects of irrigation infrastructure performance.

**Keywords:** Main Irrigation System, Irrigation System Performance Index, Permen PU No. 12/PRT/M/2015

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## **I. INTRODUCTIONS**

The Sausu Irrigation Area is one of the main irrigation areas supporting rice productivity in Central Sulawesi, particularly in Parigi Moutong Regency. Located in Sausu District, Parigi Moutong Regency, the Sausu Irrigation Area covers a service area of 8,190 hectares. The area of the Sausu Irrigation Area is spread across three districts: Sausu District, Balinggi District, and Torue District. According to data from the Public Works and Water Resources Agency of Central Sulawesi Province in 2017, the discharge of the Sausu River ranges from approximately 23,366 to 43,010 liters per second. Damage to parts of an irrigation system will affect its efficiency and effectiveness, which is crucial in efforts to maintain and even increase rice commodity production in the Irrigation Area. Given the issues outlined, it is necessary to evaluate the performance of the Main Irrigation System in the Sausu Irrigation Area in Parigi Moutong Regency to prevent any decline in the quality of the irrigation area that could be detrimental.

### **1.1 Literature Review**

This study aims to assess the performance of the main irrigation system in the Sausu Atas Irrigation Area, Parigi Moutong Regency, which falls under the authority of the Central Sulawesi Water Resources Management Centre (BWSS III Palu). The results will be used to develop follow-up programs such as repair, rehabilitation, and the operation and maintenance of the irrigation system.

### **1.2 Research Location**

The research is located in Parigi Moutong Regency, Central Sulawesi Province, with the total area of the Sausu Irrigation Area being 8,190 hectares. The Sausu Irrigation system was constructed between 1989 and 1991. The water source comes from the Sausu River through intake points on both the right and left of the weir. The Sausu Irrigation Weir is located in Taliabo Village, Sausu District, and the irrigation service area is spread across three districts: Sausu, Balinggi, and Torue.

The Sausu Irrigation Area is designed to supply irrigation water for agricultural land covering 8,190 hectares, consisting of 7,301 hectares of left-side intake area and 889 hectares of right-side intake area. This study will be in December 2024.

This research is focused on the Sausu Atas Irrigation system, which has an overall length of approximately 45,000 meters.

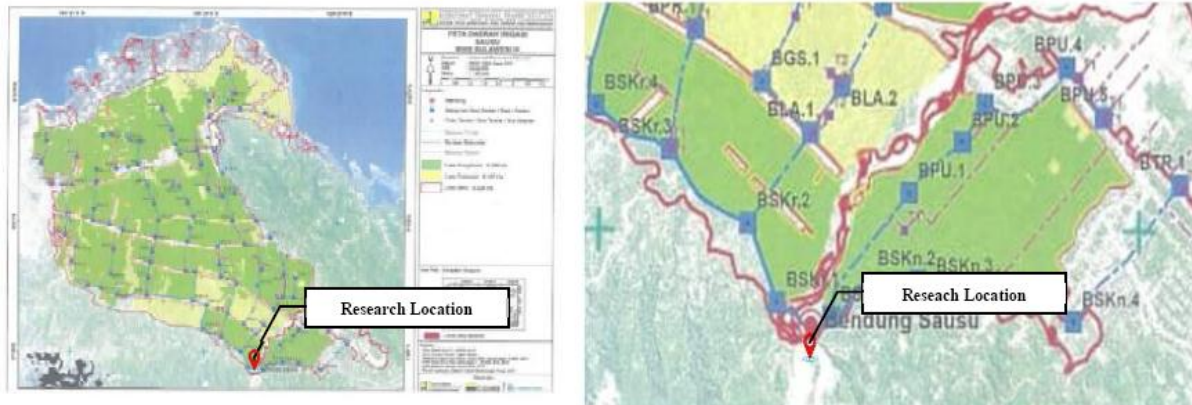


Figure 1.1 Irrigation Maps of Sausu Regency

### 1.3 Data Collection Method

The data used in this study consists of both primary and secondary data. Primary data is collected directly through field observations, which include information about the conditions of the irrigation system and interviews with irrigation managers and beneficiaries. Secondary data is obtained from relevant institutions, including data on the irrigation system area (such as basic, potential, and functional areas), irrigation system schemes, infrastructure maps, building layouts, and physical infrastructure inventories, as well as personnel organization and Water User Farmers (P3A) inventories. The method used follows the guidelines set by the Ministry of Public Works and Public Housing Regulation Number 12/PRT/M/2015 on the operation and maintenance of irrigation system. This includes data collection, field surveys, and data analysis to assess the performance of the irrigation system.

### 1.4 Data Analysis

- i. Collect inventory data on the Sausu Atas Irrigation system from the managing institution, including the 2024 Sausu Atas operation and maintenance (OP) activities data.
- ii. Conduct a survey to assess the condition of the Sausu Atas irrigation system.
- iii. Perform an analysis to evaluate the condition of the Sausu Irrigation system in 2024 using the assessment guidelines for irrigation systems based on the Ministry of Public Works and Public Housing Regulation No. 12 of 2015.
- iv. Weight the overall physical components of the irrigation system, specifically the main system.
- v. The weighting process involves both physical and non-physical components of the Sausu Atas Irrigation Area.
- vi. The weights for each main component are derived from the combination of its sub-components, which indicate the performance of the Sausu Irrigation system in 2024.

## II. RESULT AND DISCUSSION

### 2.1 Evaluation of Physical Infrastructure Condition

Based on the Regulation of the Ministry of Public Works and Public Housing (Permen PUPR) No. 12/PRT/M/2015 regarding Guidelines for the Operation and Maintenance of Irrigation Networks, the performance assessment of an irrigation system is evaluated based on six components: Physical Infrastructure, Supporting Facilities, Crop Productivity, Organizational Personnel, Documentation, and P3A (Water User Association) conditions.

The performance assessment of irrigation networks is determined by evaluating the components that are comprised of sub-components of the irrigation network. These are assessed based on field observations using the following performance categories: 80%–100% (very good performance), 70%–79% (good performance), 55%–69% (poor performance requiring attention), and <55% (poor performance requiring significant attention).

#### 2.1.1 Evaluation of Main Structure Condition

- Weir Crest Structure: The concrete cover of the weir crest has peeling on certain surface areas. Although the structure remains functional, it requires attention, with a damage level of 20%–40%, categorizing its condition as moderate (60%–80%).
- Weir Wing Walls and Supporting Components: The wing walls are in good condition, as are the

closure embankments, bridge over the weir crest, operation boards, and measuring rulers, which are still legible.

Flow rate measurement tables crossing the crest remain functional, with these components assessed as being in good condition (80%–90%).

- **Upstream Weir Floor:** The upstream floor is in good condition but partially buried in sediment. Meanwhile, the downstream weir stilling basin has moderate damage in some areas, categorizing its condition as moderate (60%–80%).
- **Intake Gates:** The left intake (8 units) and right intake (2 units) are in good working order but require rubber seal replacement to minimize leakage, placing them in good condition (80%–90%). Conversely, the right (3 units) and left (1 unit) flushing gates are non-operational due to hydraulic/mechanical (electrical, gearbox) issues, categorizing their condition as moderate (60%–80%) and requiring attention.
- **Sediment Trap:** The sediment trap structure is in good condition. Sediments are periodically cleared, and the flushing gate is operational but needs rubber seal replacement, placing its condition in the good category (80%–90%).

Overall, the functionality of all weir structure components shows minor degradation. The condition is assessed as moderate (60%–80%). By applying the maximum weight factor, each component's score is determined, as detailed in Table 2.1, under the column for the observed main structure assessment scores.

Table 2.1 Assignment of Weights to Main Structure Condition

No.	Research Object	Maximum (%)	Observation Result (%)
1.	Weir Structure	0,80	0,54
2.	Weir Wings	0,60	0,51
3.	Weir Floor	0,80	0,56
4.	Embankment Cover	0,80	0,68
5.	Bridge	0,20	0,17
6.	Operational Board	0,40	0,34
7.	Measurement Staff	0,20	0,16
8.	Safety Fence	0,20	0,17
9.	Weir Gates and Operational Gears	7,00	5,20
10.	Sedimentation Traps and Drainage Gates	2,00	1,70
<b>Total</b>		<b>13,00</b>	<b>10,04</b>

### 2.1.2 Evaluation of Conduit Condition

- **Conveyance Channels on the Sausu Left Route:** The primary channel on the Sausu Left Route is still in good condition and functional. However, damage was observed in segment 2 of the Primary Sausu Left Channel, with floor and left-wing damages along a 20-meter stretch. In the secondary channels of Anggungan, Balinggi, Gerobongan Sari, Malakosa, Palasari, Purwokerto, and Tolai, damages were observed on walls, linings, channel floors, and intake structures. Sedimentation was also found in drainage and carrier channels. The Laibago Secondary Channel (sections 1–8) shows damage to the channels and sediment accumulation. Structural damages were identified in intake structures (Bla.1, Bms.1, Bms.2 Kn, Bla.7b). The Gerobongan Sari Secondary Channel (GS. Section 3) experienced channel damage, with wing-wall collapses at Bgs.2, Bgs.2d, Bgs.3c, Bgs.4a, Bgs.5, Bgs.9, and Bgs.11. Silter and building damages occurred at Bgs.2, while plunge structures (Bgs.2, Bgs.3c) also faced deterioration. In the Anggungan Secondary Channel, damages were identified in the lining and floors of structures such as Bba.1, Bba.2, and Bag.3. Sediment accumulation occurred at Bag.3, while structural and screw gate damages were observed at Bag.6Kn. The Balinggi Secondary Channel (Ba. Sections 5–10) requires wall additions, and gates such as Bba.9 Kn.Kn show damage. The Palasari Secondary Channel exhibited damages to the gear teeth of gates (Bpa.2, Bpa.7 Kr). The Purwokerto Secondary Channel (Bssa Kr.3, Bssa Kr.5b) exhibited damages on wing walls, while Bssa Kr5d had damage to its downstream stilling basin floor, and section 6 had wall damages. The Tolai Secondary Channel (Bto Sections 1–9) experienced sediment accumulation, damages to gate plates, and wall damages at several points. Overall Condition: The conveyance channels, despite damages, retain sufficient capacity to transport the maximum planned discharge. This places the overall condition in the moderate category (>60–80%).

- **Embankments:** The height of embankments in some primary and secondary channels showed

damage to the linings, causing water to overflow. Repairs are needed to prevent overtopping. The condition is assessed as moderate (>60–80%) with a damage level of 20%–40%.

- **Maintenance:** Repairs and replacements were conducted for several secondary channels: Laibago Secondary Channel (Sections 1–8): Repairs included 2,094 m of stone masonry (2,572.2 m<sup>3</sup>), stone removal (687.67 m<sup>2</sup>), plastering (913.65 m<sup>2</sup>), and imported embankment fill (109.3 m<sup>3</sup>). Malakosa Secondary Channel (Sections 1–3): Repairs included 222.79 m<sup>3</sup> of stone masonry, 22.13 m<sup>3</sup> of stone removal, and 612.5 m<sup>2</sup> of plastering. Gerobongan Sari Secondary Channel: Repairs covered 1,622.5 m<sup>3</sup> of stone masonry, 84.6 m<sup>3</sup> of stone removal, and 2,879.65 m<sup>2</sup> of plastering. Purwokerto Secondary Channel: Repairs involved 63.3 m<sup>3</sup> of stone masonry, 37.98 m<sup>3</sup> of stone removal, and 219.4 m<sup>2</sup> of plastering. Anggungan, Balinggi, Palasari, and Tolai Secondary Channels: Repairs included stone masonry, stone removal, plastering, and embankment filling as detailed in Table 2.2. Maintenance also included sediment excavation: Laibago: 1,884.5 m<sup>3</sup>, Malakosa: 505 m<sup>3</sup>, Anggungan: 294 m<sup>3</sup>, Balinggi: 1,670.5 m<sup>3</sup>, Palasari: 1,013.6 m<sup>3</sup>, Tolai: 144 m<sup>3</sup>. Overall, the condition of conveyance channels is categorized as moderate (>60–80%) and requires regular attention. Detailed assessments are shown in Table 2.2.

Table 2.2 Evaluation of Conduit Condition

No.	Research Object	Maximum (%)	Observation Result (%)
1.	Conduit Capacity	5,00	3,50
2.	Embankment Height	2,00	1,40
3.	Repair and Maintenance	3,00	1,95
<b>Total</b>		<b>10,00</b>	<b>6,85</b>

### 2.1.3 Evaluation of Conduit Structure Condition

- **Condition of Regulatory Structures in D.I Sausu Atas Conveyance Channel:** Out of 9 intake regulating structures, 6 are in good condition, 3 have minor damage, 1 has moderate damage, and 3 are severely damaged. For intake structures: 50 are in good condition, 5 have minor damage, 15 have moderate damage, and 6 are severely damaged. Specific damages include the collapse of the Silter at Gerobongan Sari (Bgs 2, Bgs 5), moderate damage to 3 intake structures on Tolai Secondary Channel, 10 box structures with severe damage, and 1 PPA House with severe damage. 42 drop structures are in good condition, 15 have minor damage, and 16 have moderate damage. Pedestrian bridges include 55 in good condition and 14 with minor damage. For washing stairs: 31 are in good condition, 6 have minor damage, and 2 have moderate damage. Additional damage includes drop structures (Bag.1d), intake structures on Anggungan Secondary Channel (Bag.1, Bag.2, Bag.3), damage to intake structure at Balinggi Secondary Channel (Bag.6Kn), and door damage at B.Ba.g Kn. Overall Condition: The structural conditions are categorized as moderate (60–80%) and require attention.

- **Flow Measurement Structures:** Discharge measurement at intake structures is still functional and legible, with an overall condition categorized as good (80–90%). Discharge measurement devices on regulatory structures (intakes and distribution intakes) are generally in good condition, though some exhibit rust and require replacement.

- **Complementary Structures:** Minor damages are observed in drop structures at Bla.3.a, Bms.1 (stilling basin floor damage), Bssa.Kr5b, Bssa.Kr5c, Bssa.Kr5d, BLa1 (Gs.R1, BGs.2d, BGs.3c), and Bmk.3a, 3b (wing- wall and basin floor damage). Sediment and debris blockage are noted in culverts, bridges, and cross- drains, necessitating cleaning. Overall Condition: These complementary structures are categorized as moderate (60–80%) and require attention.

- **Repairs and Maintenance:** Repair activities include stone masonry, removal of damaged stone, replastering, smoothing, replacement of discharge measurement scales (peilschaal), and replacement of operation boards. Maintenance activities include repainting operation boards, sediment excavation, and cleaning of branches and grass. The condition of structures on the conveyance channels is assessed as moderate (60–80%), requiring regular maintenance and repairs. Detailed conditions are provided in Table 2.3.

Table 2.3 Evaluation of Conduit Structure Condition

No.	Research Object	Maximum (%)	Observation Result (%)
1.	Regulating Structures	2,00	1,40
2.	Flow Measurement	2,50	2,05
3.	Complementary Structures	2,00	1,44
4.	Repair and Maintenance	2,50	1,47
<b>Total</b>		<b>9,00</b>	<b>6,36</b>

2.1.4 Evaluation of Drainage Channels and Structures

- Condition of Drainage Channels in D.I Sausu Irrigation Network: The drainage system originates from natural watercourses within the D.I Sausu irrigation area. In Sausu Upper Irrigation Area, Right Intake, sedimentation has occurred in the following drainage channels: Putera 1 Drainage Channel (Segment 1): Length of 1,888 m, Trans Drainage Channel (Segment 1): Length of 1,673 m, Trans Drainage Channel (Segment 2): Length of 1,405 m. In Sausu Irrigation Area, Left Intake, sedimentation has occurred in: Gerobongan Sari Drainage Channel (BGs.6): Laibago/Balinggi (200 m), BGs.7 Drainage Channel: Laibago/Balinggi (1,000 m), Cakrasari 1 Drainage Channel: Laibago/Balinggi (1,100 m), Cakrasari 2 Drainage Channel: (350 m), Cakrasari 3 Drainage Channel: (350 m), Palasari Primary Drainage Channel (BSA.kr.7): Suli/Balinggi (600 m), Babahan Drainage Channel (Bpa.2): Tolai/Torue (1,000 m). The drainage channels remain functional, with repairs and maintenance conducted at certain points. Overall, they are categorized as moderate condition (60–80%), requiring attention. Certain sections of the conveyance channels experience water pooling during floods, leading to inundation of surrounding areas. This may result in overtopping, damaging embankments and inspection roads. Preventive measures are necessary to avoid further damage. These issues place the drainage channels and their associated structures in the moderate category (60–80%), indicating the need for attention. Details of the assessment are provided in Table 2.4.

Table 2.4 Evaluation of Drainage Channels and Structures

No.	Research Object	Maximum (%)	Observation Result (%)
1.	All drainage channels and structures have been built, listed in the maintenance register, and have been repaired and are functional	3,00	1,95
2.	No flooding issues causing inundation	1,00	0,60
<b>Total</b>		<b>4,00</b>	<b>2,55</b>

2.1.5 Evaluation of Access/Inspection Roads

- Condition of Access Roads to Main Structures: The access road to the main structures is still in good condition. For the main channel (BSKi.1) and inspection roads on the Laibago Secondary Channel, there are minor damages at several locations. However, overall, these roads fall into the good condition category (>80% - 90%).
- Condition of Inspection Roads on Secondary Channels: Several secondary channels have inspection roads that are damaged, as follows: Laibago Secondary Channel: La.R.6 (Suli Indah/Balinggi), Length: 300 m La.R.7 (Suli/Balinggi), Length: 800 m La.R.8, Length: 1,629 m La.R.10 (Laibago/Balinggi), Length: 992 m La.R.11 (Laibago/Balinggi), Length: 1,700 m La.R.12 (Malakosa/Balinggi), Length: 725 m. Gerobongan Sari Secondary Channel: Gs.R.3 (Suli Indah/Balinggi), Length: 500 m Gs.R.7 (Lebago/Balinggi), Length: 836 m Gs.R.8 (Lebago/Balinggi), Length: 1,372 m Gs.R.9 (Lebago/Balinggi), Length: 666 m Gs.R.129 (Lebago/Balinggi), Length: 1,000 m Purwokerto Secondary Channel: Ruas 1 (Beraban/Balinggi), Length: 200 m Ruas 4 (Suli/Balinggi), Length: 100 m Malakosa Secondary Channel: Mk.R.3, Length: unspecified Balinggi Secondary Channel: Ruas 4 (Balinggi/Balinggi), Length: 200 m Ruas 6 (Balinggi/Balinggi), Length: 400 m. Ruas 10 (Balinggi Jati/Balinggi), Length: 487 m. Ruas 11 (Balinggi Jati/Balinggi), Length: 743 m. Palasari Secondary Channel: Ruas 1 (Catur Karya/Balinggi), Length: 550 m. Ruas 2 (Tolai/Torue), Length: 1,014 m. Ruas 3 (Tolai/Torue), Length: 888 m. Ruas 6 (Balinggi/Balinggi), Length: 10 m. Tolai Secondary Channel: Ruas 2 (Tolai/Torue), Length: 955 m. Ruas 5 (Tolai/Torue), Length: 760 m. Ruas 6 (Tolai/Torue), Length: 300 m. Ruas 7 (Tolai Timur/Torue), Length: 1,000 m. Ruas 9 (Tolai Timur/Torue), Length: 500 m. Some inspection roads and paths alongside the channels have been repaired. Overall, these roads fall into the moderate condition category (60–80%) and require attention.
- Accessibility of Structures and Channels: All structures and channels along the inspection roads remain easily accessible. This condition is categorized as good (>80% - 90%). Details of the assessment are provided in Table 2.5.

Table 2.5 Evaluation of Access/Inspection Roads

No.	Research Object	Maximum (%)	Observation Result (%)
1.	Access road to the main building	2,00	1,70
2.	Damage to inspection roads	1,00	0,75
3.	Accessibility of inspection roads	1,00	0,80

<b>Total</b>	<b>4,00</b>	<b>3,25</b>
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### 2.1.6 Evaluation of Office, Housing, and Buildings

- Office Condition (Ranting/Pengamat/UPTD, Mantri/Juru): The office facilities for Ranting/Pengamat/UPTD (at the same level as Satker, Balai PSDA. UPT/Cab. PU. Kab/Kota) and Mantri/Juru (at the same level as Korlap Balai PSDA. UPT/Cab. PU. Kab/Kota) are inadequate. Issues include: Damaged bathrooms No storage room (warehouse) Office still under lease status. Condition: The office facilities fall into the poor condition category (<60%) with a damage level of >40%.
- Housing for Ranting/Pengamat/UPTD and Mantri/Juru: There are no housing facilities for Ranting/Pengamat/UPTD and Mantri/Juru (at the same level as Korlap Balai PSDA. UPT/Cab. PU. Kab/Kota). Condition: The value is assumed to be 0 (no housing available).
- Warehouse for Office (Ranting/Pengamat/UPTD): No warehouse or storage facilities are available for the office (Ranting/Pengamat/UPTD). Condition: The value is assumed to be 0 (no warehouse available). Details of the assessment for the office, housing, and warehouse are provided in Table 2.6.

Table 2.6 Evaluation of Office, Housing, and Warehouse

No.	Research Object	Maximum (%)	Observation Result (%)
1.	Branch Office/Observer's Office	1,00	0,45
2.	Manager's/Officer's Office	1,00	0,45
3.	Housing for Branch Office/Observers	0,50	0,00
4.	Housing for Managers/Officers	0,50	0,00
5.	Warehouse for Branch Office/Observers	0,80	0,00
6.	Warehouse for Managers/Officers	0,80	0,00
7.	Structural Equipment and Other Buildings	0,40	0,00
<b>Total</b>		<b>5,00</b>	<b>0,90</b>

## 2.2 Inventory and Evaluation of Non-Physical Infrastructure Condition

The inventory and assessment of non-physical infrastructure focus on the following components: Planting productivity (Factor K, planting realization, and rice productivity) Supporting facilities for operations and maintenance Personnel structure for OP (Operations and Maintenance) Availability of OP documentation Condition of the Water Users Farmers Association (P3A) organization The results of the assessment are aggregated to determine the weighted score of non-physical infrastructure.

### 2.2.1 Evaluation of Planting Productivity Condition

- Evaluation Object: The assessment covers the fulfillment of irrigation water needs (Factor K), planting realization, and rice productivity. Water Availability: The available water fully meets the irrigation water needs. Sausu Kanan Irrigation Area: Two planting seasons (MT I, II) with an area of 574 hectares. Sausu Kiri Irrigation Area: Three planting seasons (MT I, II, III) with an area of 5,245.38 hectares. Total planting realization per year: 16,884.14 hectares. Rice Productivity The average rice productivity is 6.13 tons/ha. The percentage of realized rice productivity compared to the planned productivity in planting seasons I, II, III is between 90 - 100%. Condition: The condition is rated as excellent (kondisi baik sekali), as shown in Table 2.7.

Table 2.7 Evaluation of Planting Productivity Condition

No.	Research Object	Maximum (%)	Observation Result (%)
1.	Irrigation Water Requirement (Factor K)	9,00	9,00
2.	Realized Planting Area	4,00	3,17
3.	Rice Productivity	2,00	1,87
<b>Total</b>		<b>15,00</b>	<b>14,04</b>

### 2.2.2 Evaluation of Operational Support Facilities Condition

- Basic Tools for OP: Tools such as grass cutting machines, chainsaw, theodolite, water level instrument (waterpass), stampers, measuring tapes (meter rolls), compasses, GPS, drones, machetes, and rakes are available and adequately meet the operational needs. Personal Protective Equipment for OP: Personal equipment such as boots, raincoats, flashlights, gloves, head protectors, wire brushes, cameras, etc., are sufficient and fulfill the necessary requirements. Heavy Equipment for Cleaning Mud and Dams: Excavators/Mini Excavators, Dump Trucks, and other heavy machinery for mud cleaning and embankment maintenance are not available. Condition: This category is rated as poor (< 60%) due to the absence of necessary heavy machinery.

- **Transportation Tools:** Pick-up trucks, motorcycles for observers, motorcycles for irrigation managers, motorcycles for irrigation officers, and bicycles for PPA/POB are inadequate and still lacking. Condition: Rated as poor (< 60%) due to shortages in transportation facilities.
- **Office Furniture and Equipment:** Desks: 4 units available, 6 units required (shortage of 2 units). File cabinets: 2 units available, 3 units required (shortage of 1 unit). Chairs: 18 units available, 25 units required (shortage of 7 units). Computers: 1 unit available, 2 units required (shortage of 1 unit). Printers: 1 unit available, 2 units required (shortage of 1 unit). Condition: Office equipment is inadequate due to shortages and is rated as poor (< 60%). **Communication Equipment:** Communication tools, particularly Handy Talkies (HT), Radios (for officers), and SSBs (for officers), are insufficient and staff have to rely on personal devices. Condition: This category is also rated as poor (< 60%) due to inadequate communication equipment. The overall condition for these supporting facilities is classified as poor (< 60%). The detailed assessment is available in Table 2.8.

Table 2.8 Evaluation of Operational Support Facilities Condition

No.	Research Object	Maximum (%)	Observation Result (%)
1.	O&P Equipment	4,00	1,47
2.	Transportation	2,00	0,60
3.	Office Equipment	2,00	0,60
4.	Communication Equipment	2,00	0,60
<b>Total</b>		<b>10,00</b>	<b>3,28</b>

### 2.2.3 Evaluation of Personnel Structure in OP Implementation

- **Responsibility and Functionality:** The OP implementers, including Ranting/Observers, Irrigation Officers (Juru/Mantri), and PPA/POB, have clear responsibilities and tasks aligned with their respective functions. Their competency levels are adequate and they demonstrate a good understanding of OP. Although regular training and guidance are conducted, the personnel are performing well within their roles. Condition: This aspect is rated as excellent (> 90% - 100%).
- **Quantity of Personnel:** The number of personnel for Ranting/Observers, Irrigation Officers (Juru/Mantri), and PPA meets the required staffing levels. However, the percentage of PPA/POB employees with civil servant status is less than 70%. Condition: This aspect is rated as moderate (> 60% - 80%) due to the lower proportion of civil servants. The overall assessment of the structure of OP personnel is satisfactory, with a high level of competence but some gaps in civil servant staffing. The detailed results are available in Table 2.9.

Table 2.9 Evaluation of Personnel Structure in OP Implementation

No.	Research Object	Maximum (%)	Observation Result (%)
1.	Organization with Clear Task and Responsibility Limits	5,00	4,55
2.	Personnel	10,00	7,40
<b>Jumlah</b>		<b>15,00</b>	<b>11,95</b>

### 2.2.4 Evaluation of OP Documentation Condition

- **Irrigation Area Data Book:** The Irrigation Area Data Book for the Sausu Upper region is quite complete, with maps and images such as the irrigation network diagram and organizational structure displayed on the office walls. This portion of the documentation is in good condition (> 80% - 90%). **Incomplete Documentation:** However, some documentation is incomplete, including images of the implementers, irrigation area maps, and as-built drawings. These missing elements impact the overall condition of the documentation. **Overall Condition:** Considering the missing components, the documentation is categorized as moderate (> 60% - 80%). The assessment of the OP documentation is available in Table 4.10.

Table 2.10 Evaluation of OP Documentation Condition

No.	Research Object	Maximum (%)	Observation Result (%)
1.	Sausu Irrigation Data Book	2,00	1,70
2.	Maps and Diagrams	3,00	2,06
<b>Total</b>		<b>5,00</b>	<b>3,76</b>

2.2.5 Evaluation of P3A (Irrigation Water User Farmers' Association) Condition

- P3A/IP3A Legal Status: The P3A/IP3A of the Sausu Irrigation Area is complete and has a legal status. It has a notarial deed and ADRT (organization's articles of association). Therefore, the condition is in the good category (> 80% - 90%).
- Institutional Development: The institutional condition of P3A/IP3A is classified as developing, which results in a 100% rating (excellent condition).
- Membership and Participation: The P3A members actively participate in monthly meetings with the branch observers, but the participation rate is 60%. P3A is also actively involved in network surveys, repairs, and disaster management, has a work program, and participates in P3A/GP3A/IP3A contributions. This participation is rated as good (> 80% - 90%).
- Meeting Attendance and Planning: P3A participates in routine meetings and is actively involved in crop planning and water allocation, which is rated as excellent (> 90% - 100%). The full assessment of P3A's condition is available in Table 2.11.

Table 2.11 Evaluation of P3A Condition

No.	Research Object	Maximum (%)	Observation Result (%)
1.	GP3A/IP3A legally established	1,50	1,33
2.	Condition of GP3A/IP3A institutions	0,50	0,50
3.	P3A meetings with observers/ranting and villages	2,00	1,20
4.	P3A active participation in network survey and exploration	1,00	0,85
5.	Participation in network repair and disaster management	2,00	1,70
6.	P3A contributions for network repairs	2,00	1,70
7.	Participation in crop planning and water allocation	1,00	0,95
<b>Total</b>		<b>10,00</b>	<b>8,23</b>

2.3 Irrigation System Performance Index of the Sausu Atas Main Irrigation

Based on the performance assessment of the main irrigation system, the Performance Index achieved a value of 71.26%, with a maximum score of 100% and a minimum of 55%. This result falls within the standard range outlined in the Ministerial Regulation, which has a performance range of 70% – 79%, categorizing the system's performance as good. The required actions for a system categorized as "good" are routine maintenance and periodic maintenance. This information is summarized in Table 2.12.

Table 2.12. Performance Index of the Main Irrigation System



The Performance Evaluation of the Irrigation System in the Sausu Irrigation Area Parigi ..

PERFORMANCE EVALUATION OF IRRIGATION SYSTEMS

Irrigation Area : Di. Sausu Atas  
 Irrigation Area Coverage : 7100 Ha  
 RC21 Years : 2024

FORM II A  
 With Sedimentation Basin

MAIN IRRIGATION SYSTEM

Descriptions	Final Weight %	Sections Value %	Condition Index		Informations
			Existing %	Maximum %	
<b>I. Physical Infrastructure</b>	<b>28.10</b>	<b>100</b>	<b>84.88</b>	<b>46.00</b>	
<b>1 Main Building</b>	<b>10.04</b>	<b>100</b>	<b>77.21</b>	<b>13.00</b>	
1.1 Water	3.13	100	79.36	4.00	
a. Crest	0.64	20	86.00	0.80	
b. Wing	0.61	15	85.00	0.80	
c. Weir Floor	0.88	20	70.00	0.80	
d. Dike Closure	0.68	20	85.00	0.80	
e. Bridge (above crest/services)	0.17	5	85.00	0.20	
f. Operational Board	0.34	10	85.00	0.40	
g. Measuring Rod	0.18	5	80.00	0.20	
h. Safety Fence	0.17	5	85.00	0.20	
1.2 Operated Gates and Gears	6.20	100	74.94	7.00	
a. Intake Gate	2.87	50	82.00	3.50	
b. Sluice Gate	2.33	50	69.87	3.50	
1.3 Sedimentation and Its Sluice Gate	1.70	100	86.00	2.00	
a. Sedimentation Basin is in Good Condition	0.99	35	85.00	0.70	
b. Sedimentation Basin has been Cleaned	0.61	30	85.00	0.50	
c. Sluiced Gate & Gear of the Sedimentation Basin could be operated	0.60	35	85.00	0.70	
<b>2 Conveyance Channel</b>	<b>8.85</b>	<b>100</b>	<b>88.60</b>	<b>10.00</b>	
2.1 The capacity of each channel is sufficient to carry the required maximum planned flow.	3.60	50	78	5.00	
2.2 The embankment height is adequate to prevent overflow at all times during operation.	1.40	20	70	2.00	
2.3 All channel repairs have been completed.	1.85	30	86	3.00	
<b>3 Structures on the Conveyance Channel</b>	<b>8.41</b>	<b>100</b>	<b>71.21</b>	<b>9.00</b>	
3.1 Control Structures (Divides/Branch Off-Take-off) Complete and Functional	1.40	100	70.00	2.00	
a. operational at all times and necessary for both the main and secondary channels.	0.70	50	70.00	1.00	
b. At each tertiary take-off point.	0.70	50	70.00	1.00	
3.2 Flow Measurement can be performed according to the plan/Operation of Irrigation System (D3)	2.10	100	84.00	2.50	
a. At the Intake Structure (Intake Gate)	0.90	40	80.00	1.00	
b. At each Control Structure (Divide/Branch Off-Take-off)	0.60	30	80.00	0.75	
c. At each tertiary take-off	0.60	30	80.00	0.75	
3.3 Supplementary Structures are functional and complete	1.44	100	72.00	2.00	
a. On the Main and Secondary Channels	0.80	40	75.00	0.80	
b. At Sluice Structures, Culverts, Bridges, Flumes, and Cross Channels-are blockages occur	0.84	50	70.00	1.20	
3.4 All Requirement have been Completed	1.47	100	68.75	2.50	
a. Repair of Control Structures (Divide/Branch Off-Take-off)	0.88	50	70.00	1.25	
b. Measuring Rod, Scale Lath, and Water Level Indicators	0.00	15	0.00	0.38	
c. Operational Board	0.25	20	70.00	0.50	
d. Supplementary Structures	0.24	15	65.00	0.38	
<b>4 Drainage Channel and Structures</b>	<b>2.66</b>	<b>100</b>	<b>89.75</b>	<b>4.00</b>	
4.1 All drainage channels and their structures have been constructed, filled in the maintenance register, and have been repaired and are functional.	1.95	75	86.00	3.00	
4.2 No flooding issues causing inundation.	0.69	25	80.00	1.00	
<b>6 Access Road / Inspection Road</b>	<b>3.25</b>	<b>100</b>	<b>81.25</b>	<b>4.00</b>	
6.1 The access road to the main building is in good condition.	1.70	60	80.00	2.00	
6.2 The inspection road and footpath along the channel have been repaired.	0.76	26	76.00	1.00	
6.3 All structures and channels under maintenance are easily accessible.	0.80	26	80.00	1.00	
<b>8 Office, Housing, and Warehouse</b>	<b>0.90</b>	<b>100</b>	<b>18.00</b>	<b>6.90</b>	
8.1 The office is adequate for: - Branch/Observer/UPTD (Equivalent to PSDA Work Unit Office, UPT/Cab. of Public Works at District/City level) - Supervisor/Operator (Equivalent to Section Head of PSDA Work Unit Office, UPT/Cab. of Public Works at District/City level)	0.60	100	46.00	2.00	
8.2 Housing is adequate for: - Branch/Observer/UPTD (Equivalent to PSDA Work Unit Office, UPT/Cab. of Public Works at District/City level) - Supervisor/Operator (Equivalent to Section Head of PSDA Work Unit Office, UPT/Cab. of Public Works at District/City level)	0.60	100	0.00	0.50	
8.3 Warehouse is adequate for: - Branch Office/Observer/UPTD - Main Building (BD) - Concrete Beams and Equipment in other buildings	0.60	100	0.00	2.00	

Irrigation Network Performance Index

Descriptions	Final Weight %	Sections Value %	Condition Index		Informations
			Existing %	Maximum %	
<b>II CROP PRODUCTIVITY (Previous Year)</b>	<b>14.05</b>	<b>100</b>	<b>93.64</b>	<b>15.00</b>	
1 Water Requirement Fulfillment (K Factor)	9.00	100	100	9.00	
2 Actual Planting Area (*)	3.17	100	79.27	4.00	
Functional Area (Ha) : 7.100,00 (*)					
Planting Seasons		Maximum			
MT.I		5.619,38			
MT.II		5.619,38			
MT.III		5.245,35			
Total (I,II,III)		16.564,14			
IP Maks (kg)		300			
Plant Index (IP)		237,80			
Existing = (b) / (a) x 100 %					
Percentage of Actual Plant Area = (d) / (c) x 100 %			79,27		
3 Rice Productivity (c)	1.87	100	93,73	2,00	
Rice Productivity Average ton/ha	6,13				
Produktivitas Padi (kg/ada ton/ha)	5,75				
Productivity Percentage Padi = (b) / (a) x 100 %			93,73%		
If the actual rice production - average production, the productivity percentage in (c) is recorded as 100%.					
<b>III SUPPORTING FACILITIES</b>	<b>3.28</b>	<b>100</b>	<b>32.75</b>	<b>10.00</b>	
1 Operation & Maintenance Equipment:	1.48	100	35,88	4,00	
1.1. Basic tools for routine maintenance	0.60	50	30,00	2,00	
1.2. Personal equipment for operations	0.43	12,5	85,00	0,50	
1.3. Heavy equipment for sediment removal and embankment maintenance	0.45	37,5	30,00	1,50	
2 Transportation	0.60	100	30,00	2,00	
2.1. Branch/Observer (motorcycle)	0.30	50	30,00	1,00	
2.2. Operator/Supervisor (motorcycle)	0.15	25	30,00	0,50	
2.3. PPA/POB (icycle)	0.15	25	30,00	0,50	
3 Office Equipment for Branch/Observer/UPTD	0.60	100	30,00	2,00	
3.1. Basic office furniture	0.30	50	30,00	1,00	
3.2. Office work tools (computer and printer)	0.30	50	30,00	1,00	
4 Communication Equipment	0.60	100	30,00	2,00	
4.1. Adequate communication network for Branch/Observer - O&M Subdivision	0.60	100	30,00	2,00	
<b>IV ORGANIZATION AND PERSONNEL</b>	<b>12.85</b>	<b>100</b>	<b>85.67</b>	<b>15.00</b>	
1 Organization has been structured with clear responsibilities and task definitions	4.55	100	91,00	5,00	
1.1. Branch/Observer	1.70	40	85,00	2,00	
1.2. Operator/Supervisor	1.90	40	95,00	2,00	
1.3. PPA/POB	0.95	20	95,00	1,00	
2 Personnel	6.30	100	85,00	10,00	
2.1. Quantity/Number is in accordance with the requirements	3.70	100	90,00	4,00	
- Branch/Observer/UPTD	0.88	25	85,00	1,00	
- Operator/Supervisor	0.95	25	95,00	1,00	
- PPA	1.90	50	95,00	2,00	
2.2. > 70% of PPA/POB are Civil Servants (if > 70%, the section weight is 100%)	1.20	100	60,00	2,00	
2.3. All personnel are knowledgeable about O&M	3.40	100	85,00	4,00	
- Branch/Observer/UPTD	0.85	25	85,00	1,00	
- Operator/Supervisor	1.70	50	85,00	2,00	
- PPA	0.85	25	85,00	1,00	
<b>V DOCUMENTATION</b>	<b>3.76</b>	<b>100</b>	<b>75.13</b>	<b>5.90</b>	
1 Irrigation System Data Book	1.70	100	85,00	2,00	
2 Maps and Drawings	2.06	100	68,55	3,00	
2.1. Data wall at the office	0.84	33	85,00	1,00	
2.2. Implementation drawings	0.30	33	30,00	1,00	
2.3. Network schematics (implementation & structures)	0.92	34	50,00	1,00	
<b>VI FARMERS' WATER USERS ASSOCIATION (P3A)</b>	<b>8.23</b>	<b>100</b>	<b>82.33</b>	<b>10.00</b>	
A Number of P3A Villages : 80 Units					
B Number of GP3A : 8 Units					
C Number of P3A : 1 Units					
Total B + C : 9 Units					
1 GP3A/P3A are legally established	1.33	15	88,88	1,50	
2 Institutional Status of GP3A/P3A	0.50	5	100,00	0,50	
Developed	100%				
Developing	60%				
Not Developed	30%				
3 Meetings between Ulu-ulu/P3A Villages/GP3A and Observers/Branches	1.20	20	60,00	2,00	
Every half month	100%				
Once a month	60%				
Irregular	40%				
Not Held	0%				
4 P3A actively participates in network surveys/inspections	0.85	10	85,00	1,00	
5 P3A participation in network repairs and disaster management	1.70	20	85,00	2,00	
6 P3A contributions are used for tertiary network repairs	1.70	20	85,00	2,00	
Economic	100%				
7 P3A participation in planting planning and water allocation	0.95	10	55,00	1,00	
<b>TOTAL (1 + 2 + 3 + 4 + 5 + 6)</b>	<b>71.26</b>			<b>100.00</b>	

Irrigation Network Performance Index

III. CONCLUSION

Based on the research conducted by the author, it can be concluded that the performance of the Sausu Atas Irrigation Area, evaluated from both physical and non-physical aspects in accordance with the Ministry of Public Works and Public Housing Regulation No. 12/PRT/M/2015, has a performance index of 71.26%. Therefore, the performance of the Sausu Atas Irrigation Network falls into the "Good" category (with a score range of 70–79%). The recommended action is regular maintenance inspections. Among the six evaluation indicators, the component with the highest contribution is the Planting Productivity, with an existing condition score of 14.05%. The component with the least contribution is the Office, Housing, and Warehouse, with an existing condition score of 0.90%.

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