

Republic of Indonesia

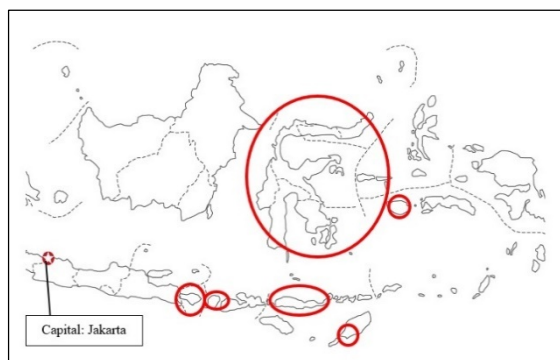
FY2021 Ex-Post Evaluation Report of
Japanese ODA Loan Project
“Decentralized Irrigation System Improvement Project (II)”
External Evaluator: Kenichi Inazawa, Octavia Japan, Co., Ltd.

0. Summary

This project aimed to increase food production, such as rice, in the nine eastern provinces of Indonesia, by renovating, extending and newly constructing irrigation facilities and by assisting the development of operation and maintenance systems, thereby improving food security and the incomes of farmers in the target region. This project has “consistency with the development plan” and “consistency with the development needs.” As for coherence, “consistency with Japan’s ODA Policy” can be confirmed. On the other hand, no concrete cooperation was expected in relation to “internal coherence” at the time of the appraisal and “external coherence” has not been confirmed as there is no cooperation, due to the fact that the target areas of this project are different from those of other donors. Therefore, its relevance and coherence are high. Regarding efficiency, the outputs were mostly as planned, and the project cost was within the plan. However, the project period significantly exceeded the initial plan, due to land acquisition procedures and heavy rains and floods that delayed the construction process. Therefore, efficiency of the project is moderately low. Regarding effectiveness and quantitative effect indicators, the “area benefiting from the project” and “rice production” exceeded the targets, while “cropping intensity,” “rice yield” and the “rate of Water Users’ Association (hereinafter referred to as “WUA”) presence” almost reached the targets or exceeded the targets. It was confirmed during the interviews that this project has resulted in an increase in rice production and frequency of planting, and depending on the subproject, farm incomes have increased and labor (agricultural work) has been reduced, owing to the supply of more efficient irrigation water. Similarly, regarding impacts, it was observed that the living environment of farmers has improved. As the food security index of each province is high, in which the subprojects targeted by this project are located, it can be inferred that this project has contributed to the stable supply of rice and to the improvement of self-sufficiency. Therefore, effectiveness and impacts of the project are high. Regarding sustainability, while no major concerns have been observed, it has been noted that certain issues exist in the institutional/organizational (mainly personnel system), technical and financial aspects of operation and maintenance. Therefore, the sustainability of the project is moderately low.

In light of the above, this project is evaluated to be satisfactory.

1. Project Description



Project Locations
(Project Areas are inside the Red Circles)



Developed Dam
(Tommo Subproject)

1.1 Background

Before this project began, President Yudhoyono (the first administration) showed a plan to increase domestic food-sufficiency through increased domestic rice production; he announced a goal to increase the rice production target from 55 million tons (based on rice husk rice) to 61 million tons (same as above) by 2008. However, achieving the target was expected to be difficult, as there was already a limit on land use in Java Island, the main rice producing area at that time. On the other hand, the development potential of the eastern region of Indonesia was high, with a focus on agriculture and fisheries. However, employment opportunities were limited except for primary-related industries and economic development was delayed. The proportion of the population below the poverty line in the region was 18.8%, which was higher than the national average of 16.6%.¹ Therefore, in this region, it was important to invest in and develop the agricultural sector, which has a large working population. In particular, promoting improvements in agricultural productivity and farmers' incomes by expanding irrigation facilities was required urgently, so as to reduce regional disparities and poverty.

1.2 Project Outline

The objective of this project is to increase food production such as rice in the nine eastern provinces of Indonesia, by renovating, extending and newly constructing irrigation facilities, and by assisting the development of operation and maintenance systems, thereby improving food security and incomes of farmers in the target region.

¹ The source is JICA data (2004 data). The Indonesian Central Statistics Bureau (BPS) set the poverty line standard (the standard during the first half of the 2000s) as the minimum spending level necessary to obtain food equivalent to 2,100 kcal per person per day and 25-27 non-food items, e.g., from the clothing, housing, education, health and transportation sectors.

Loan Approved Amount/ Disbursed Amount	8,967 million yen / 8,591 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	March 28, 2008 / March 28, 2008
Terms and Conditions	Interest Rate 1.40% (Civil Engineering Work) 0.01% (Consulting Services) Repayment Period 30 years (Grace Period 10 years) Conditions for Procurement General Untied
Borrower/ Executing Agency	Republic of Indonesia/ Director General of Water Resources (hereinafter referred to as “DGWR”), Ministry of Public Works and Housing
Project Completion	June 2016
Target Area	Nine provinces in eastern Indonesia (West Sulawesi, Southeast Sulawesi, North Sulawesi, South Sulawesi, East Nusa Tenggara, West Nusa Tenggara, Bali, Gorontalo, Maluku Provinces)
Main Contractor (s) (Over 1 billion yen)	No contractor over one billion yen
Main Consultant (s) (Over 100 million yen)	Euroconsult Mott Macdonald (Netherlands)/PT. Amurwa International (Indonesia)/ PT. Puser Bumi (Indonesia) (JV), PT. Tritunggal P. Konsultant (Indonesia)
Related Studies (Feasibility Studies, etc.)	“Implementation Plan (I/P),” DGWR (2007)
Related Projects	[ODA Loan Projects] - “Small Scale Irrigation Management Project (1)” (L/A signed in 1989) - “Small Scale Irrigation Management Project (2)” (L/A signed in 1994) - “Small Scale Irrigation Management Project (3)” (L/A signed in 1997) - “Small Scale Irrigation Management Project (4)” (L/A signed in 2002) [Technical Cooperation Projects] - “The Project on Formulation of Irrigation Development and Management Strategy for Food Security” (2018–2022) [Other International Organizations, Aid Agencies, etc.] - “Water Resources and Irrigation Sector Management Program” (World Bank, implementation period is unknown) - “Participatory Irrigation Sector Project” (Asian Development Bank, implementation period is unknown)

2. Outline of the Evaluation Study

2.1 External Evaluator

Kenichi Inazawa, Octavia Japan, Co., Ltd.

2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule.

Duration of the Study: September, 2021–November, 2022

Duration of the Field Study: No oversea travel. Surveys were conducted remotely utilizing a local survey assistant.

2.3 Constraints during the Evaluation Study

(Conducting Surveys Remotely Utilizing a Local Survey Assistant)

In this survey, due to COVID-19, the external evaluator did not travel to Indonesia. Utilizing the local survey assistant, the external evaluator remotely conducted the project site inspections, information/data collection and interviews of individuals related to the project. The information was examined by the external evaluator, based on which evaluation analysis and judgement were made.

(Evaluation Based on the Actual Situations Across the Visited Sites)

This project targeted many sites; there are 15 irrigation subprojects in total. Due to time constraints, all sites could not be visited during this survey. The following six sites (seven irrigation subprojects) were visited: (1) the Bena subproject and (2) the Mbay Kiri subproject in East Nusa Tenggara Province, (3) the Lamasi subproject and (4) the Saddang subproject (Phase 3 and 4) in South Sulawesi Province, (5) the Tommo subproject in West Sulawesi and (6) the Way Apu subproject in Maluku Province. Across these sites, information and data were collected, and interviews were conducted regarding the status of the outputs, project effect, impacts, operation and maintenance. Regarding the actual values based on the effectiveness and quantitative effect indicators, in addition to the six visited sites, information and data from additional six sites (six irrigation subprojects) were analyzed (although these sites were not visited, they answered the questionnaire). However, analyses on the effectiveness and qualitative effects, impacts and sustainability were conducted based on the situations across the six visited sites.²

² Information and data were obtained from the following six sites (six irrigation subprojects): the Empus-Sungi (Bali Province), Bajo (South Sulawesi), Wawatobi (Southeast Sulawesi), Traut (North Sulawesi), Sangkub Kiri (North Sulawesi) and Paguyaman (Gorontalo) irrigation subprojects. Of the total 15 sites, answers to the questionnaire were not received from the Pengga Gebong and Jurang Sate irrigation subprojects (both are located in West Nusa Tenggara).

3. Results of the Evaluation (Overall Rating: B³)

3.1 Relevance/Coherence (Rating: ③⁴)

3.1.1 Relevance (Rating: ③)

3.1.1.1 Consistency with the Development Plan of Indonesia

Before this project began, the government of Indonesia formulated the *National Medium-Term Development Plan (RPJM)* (2004–2009), forecasting an annual growth rate of 3.5% for the agricultural sector by 2009, and listing the improvement of farm incomes and welfare as the main priority goals. In addition, to achieve domestic economic growth and food self-sufficiency, agricultural revitalization was advocated, while establishing improvements in food self-sufficiency, productivity, competitiveness and the added value, etc., of agricultural products. was regarded as basic policy.

At the time of the ex-post evaluation, the government of Indonesia developed the *National Medium-Term Development Plan (RPJMN)* (2020–2024), in which improvements in agricultural productivity, access to agriculture and the quality of agricultural products were highlighted as priorities. In addition, the *Long-Term National Development Plan (RPJPN)* (2005–2025), formulated by the government in 2005, was still ongoing at the time of the ex-post evaluation. In this plan, the improvement of citizens' nutrition and food security was set as a national development goal. Furthermore, the government announced the *2020-2024 Agricultural Strategic Policy* in 2019, aiming at improving agricultural productivity nationwide. Additionally, President Joko Widodo announced the expansion of the *Food Estate Program* in September 2020, which was intended to secure the domestic food supply and break the dependence on food imports; the areas expected to become agriculture centers, namely, the East Nusa Tenggara and Papua provinces in the eastern region of Indonesia were highlighted. In this region, the existing Paselloreng Dam, Ladongi Dam, Bintang Bano Dam and the Rotiklot Dam, etc., are being renovated for use as irrigation water sources, so as to increase the amount of water. It is expected that agricultural productivity, food production and farmers' incomes will increase in the surrounding areas.

Based on the above, improvements in agricultural productivity, food security and food self-sufficiency were regarded highly in terms of importance before this project began and also at the time of the ex-post evaluation. Therefore, there is consistency with the policies and measures.

3.1.2.1 Consistency with the Development Needs of Indonesia

Before this project began, the economic development of the eastern region of Indonesia was delayed compared to the other regions of the country. Employment opportunities were limited

³ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

⁴ ④: Very High, ③: High, ②: Moderately Low, ①: Low

except for those in the primary industries, such as agriculture and fisheries. The percentage of the population below the poverty line in the region was 18.8%, higher than the national average of 16.6%. It was, therefore, important to invest in and develop the agricultural sector with such a large working population in this region. In particular, promoting improvements in agricultural productivity and farmers' incomes by expanding irrigation facilities was regarded as an urgent task, so as to reduce regional disparities and poverty.

At the time of the ex-post evaluation, in relation to the *National Medium-Term Development Plan (RPJMN)* (2020–2024) and the *2020-2024 Agricultural Strategic Policy* mentioned in 3.1.1.1, the DGWR anticipates a food crisis after 2022. For this reason, it is recognized that efforts to improve food self-sufficiency with a focus on rice, through the development of the agricultural sector, will become even more important. Progress on investments in the agricultural sector is expected, not only in the eastern region of Indonesia but nationwide.

Based on the above, efforts to invest in and develop the agricultural sector were observed before the start of this project, as well as at the time of the ex-post evaluation, such as improvements in agricultural productivity, food self-sufficiency and farm incomes across the entire country, including the eastern region of Indonesia. Therefore, this project is consistent with the development needs.

3.1.2 Coherence (Rating: ②)

3.1.2.1 Consistency with Japan's ODA Policy

Before the start of this project, Japan developed the *Country Assistance Program for Indonesia* (November 2004). This document listed the “creation of a democratic and fair society” as one of the priority areas, promoting to support the development and management of infrastructures related to the “development of agricultural and fishing communities.” In addition, the *Medium-Term Strategy for Overseas Economic Cooperation Operations* (April 2005), developed by JICA (formerly JBIC), listed “poverty reduction,” “foundation for sustained growth” and “human resources development,” etc., as priority areas.

This project supported the improvements in agricultural productivity and farm incomes by expanding irrigation facilities in the eastern region of Indonesia, where economic development was delayed. This is in line with Japan's response to the agricultural sector, specified in the *Country Assistance Program for Indonesia* and to the development of foundation for sustained growth specified in the *Medium-Term Strategy for Overseas Economic Cooperation Operations*. Therefore, this is consistent with Japan's ODA policy.

3.1.2.2 Internal Coherence

JICA implemented ODA loan projects, such as the “Small Scale Irrigation Management Project

(1)-(4)” before this project began. This project is the fifth phase (succeeding project) and entails the development and renovation of irrigation facilities in the eastern region. While this project aimed to improve agricultural productivity through the development and renovation of irrigation facilities in the same region, the Saddang subproject in South Sulawesi Province, which was covered by the fourth phase project, continued to be the subject of this project (the fifth phase) as regards renovation works. This irrigation subproject targeted many irrigation canals that required renovation, and it is a major production area with vast agricultural land. Considering the high potential for increased rice production, this project was implemented in this area as a particular need was recognized. This is a case where an expectation for increased production was highlighted, in addition to the fact that there were significant needs within the same subproject. Although one can argue that there was “project continuity as expected,” no specific cooperation was anticipated at the time of the appraisal, and therefore, it cannot be concluded that there was internal coherence.

3.1.2.3 External Coherence

Before this project began, the World Bank through its “Water Resources and Irrigation Sector Management Program” (WISMP) supported the improvements in terms of capacity to maintain water resources in river basins and irrigation facilities, as well as the improvement of productivity with irrigated agriculture. In addition, the Asian Development Bank through its “Irrigation Sector Project” supported irrigation management plans, capacity development for WUAs and the improved operation of irrigation facilities and irrigated agriculture, etc., with the aim of realizing sustainable irrigation systems and reducing poverty. These interventions complement this project and can be referred to as a “mutual complementary relationship” from the viewpoint of supporting the agriculture and irrigation sector in Indonesia. However, the target areas of these interventions were different from this project, therefore, it cannot be said that there was “cooperation among the projects.”

In relation to international frameworks, this project contributes to food security and increasing farm incomes through increased food production. From this viewpoint, it is considered to be consistent with the second Sustainable Development Goal (SDG), “End hunger, achieve food security and improved nutrition and promote sustainable agriculture.”

<Summary of Relevance/Coherence>

This project has “consistent with the development plan” and “consistent with the development needs.” This project has “consistent with the development plan” and “consistent with the development needs.” Regarding "internal consistency," although there was continuity in the project as planned, no specific cooperation was planned at the time of project appraisal. Regarding “external consistency,” although the project had a mutual complementary relationship with other interventions from the viewpoint of supporting the agriculture and irrigation sector in Indonesia, no cooperation was confirmed, as the other donors’ projects covered different areas from this project. However, "consistency with Japan's development cooperation policy" was confirmed. Therefore, its relevance and coherence are high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

Table 1 shows the plan and actual outputs of this project at the time of appraisal and ex-post evaluation. The project has 15 sites (subprojects): new construction (one location), renovation (eight locations), extension (three locations) and renovation and extension (three locations) of the irrigation facilities across nine provinces of the eastern region. Table 1 shows the plan and actual outputs at the time of the ex-post evaluation. (The underlined sections highlight the main differences from the time of planning). In addition, Table 2 shows a list of subprojects, output types and areas which have benefited from the project.

Table 1: Plan and Actual Outputs of This Project

Plan (at the time of the appraisal: 2008)	Actual (at the time of the ex-post evaluation: 2021–2022)
1) Civil Engineering Work, etc. Renovation, extension, new construction of irrigation facilities (weirs, headworks, primary canals, secondary canals, tertiary canals, etc.) → 14 sites: the total area benefiting from the project is 81,600 ha	1) Civil Engineering Work, etc. Renovation, extension, new construction of irrigation facilities (weirs, headworks, primary canals, secondary canals, tertiary canals, etc.) → <u>Implemented almost as planned (15 sites, the total area benefiting from the project is 94,933 ha. (Breakdown: new construction 2,500 ha, renovation 80,390 ha, extension 12,043 ha, total 94,933 ha))</u>
2) Consulting Services Tendering assistance, construction supervision, support for strengthening irrigation facility operation and maintenance capacity (strengthening government-affiliated organizations and WUAs, water management (including farming support),	2) Consulting Services → <u>Implemented almost as planned (however the service period was extended)</u>

asset management, etc.), project evaluation and monitoring, project implementation assistance, etc.	
3) Strengthening of WUAs, Water Management and Asset Management The executing agency and local government lead the strengthening of irrigation facility maintenance and irrigation water management. The ODA loan consultants assist and supervise	3) Strengthening of WUAs, Water Management and Asset Management → <u>Implemented almost as planned</u>

Source: JICA documents (appraisal), Project Completion Report, answers to the questionnaire, and interviews (at the time of the ex-post evaluation)

Table 2: List of Project Areas, Output Types, Area Benefiting from the Project (Actual)

(unit: ha)

	Subproject	Type of Development	Area Benefiting from the Project	Type of Development Achieved		
				Renovation	Extension	New Irrigation
1	Empas Sungi	Renovation	4,462	4,462	-	-
2	Pengga Gebong	Renovation	4,790	4,790	-	-
3	Jurang Sate	Renovation	6,100	6,100	-	-
4	Bena	Extension	2,800	-	2,800	-
5	Mbay Kiri	Extension	388	-	388	-
6	Saddang Phase 3	Renovation	24,479	24,479	-	-
7	Saddang Phase 4	Renovation	18,342	18,342	-	-
8	Lamasi	Renovation/Extension	7,150	3,332	3,818	-
9	Bajo	Renovation/Extension	5,828	3,194	2,634	-
10	Wawotobi Phase II	Renovation	4,309	4,309	-	-
11	Tommo	New Construction	2,500	-	-	2,500
12	Toraut	Renovation	5,436	5,436	-	-
13	Sangkub Kiri	Extension	1,796	-	1,796	-
14	Paguyaman Phase II	Renovation	2,522	2,522	-	-
15	Way Apu	Renovation/Extension	4,031	3,424	607	-
Total:			94,933	80,390	12,043	2,500

Source: Project Completion Report

The differences between the plan and the actual achievements shown in Table 1 are explained below:

1) Civil Engineering Work

a) Change and Increase/Decrease of the Subprojects

Although 14 sites were planned at the time of the appraisal, the actual number of sites was 15. This is because two of the subprojects requested by the Indonesian side were found to be difficult to develop; (1) in one subproject, developing irrigation facilities turned out to be difficult in terms of technical designs and (2) another subproject was located inside a nature conservation area. As a result, two other subprojects were selected as their alternatives.⁵ In addition, the Sangkub Kiri subproject in North Sulawesi was newly selected for this project, as North Sulawesi was recognized by the parties involved in the project as a region with great potential for increasing food production.⁶

b) Increase/Decrease of Area Benefiting from the Project

The Mbay Kiri and Lamasi subprojects are examples of subprojects that experienced a major increase or decrease in terms of the areas benefiting from the project. In the case of the Mbay Kiri subproject, land was allocated to a salt farm, which resulted in a reduction of the area benefiting from the project.⁷ In addition, in certain areas (mainly downstream), construction was stopped as negotiations with the local community did not go well with regard to the acquisition of land for the construction of the main and secondary canals. Initially, 1,638 ha was planned to benefit from this project. However, due to land allocation to the salt farm and troubled land acquisition, the area expected to benefit from the project decreased to 388 ha. Regarding the Lamasi subproject, although the initial plan was that 3,332 ha would benefit from the project, as a result of the re-examination of the water use balance calculation at the headworks facility during the detailed design stage, the function of the irrigation facility was found to be higher, and it was expected that 7,150 ha would benefit from the project.

⁵ The subprojects selected at this stage are Wawotobi Phase II and Paguyaman Phase II, as shown in Table 2.

⁶ In 2012, JICA approved the Indonesian side's request to change the subproject.

⁷ The allocation of salt farm land is shown below: (a) In 2009, a briefing session was held at the Mbay Kiri subproject, which was attended by the local government (Nagekeo Regency), the DGWR, local community leaders, residents—a total of 170 people—all of whom agreed to the extension of the irrigation facility. (b) In 2010, the DGWR sent a letter to the local government (Nagekeo Regency) to request smooth progress regarding the land acquisition procedure for the irrigation facility extension. Within the same year, a meeting of those involved in the project was held, as well as a briefing session for the local residents. The local residents' demands for land acquisition were met, and a ceremony was held prior to starting construction. (c) An Australian salt manufacturing company and a local government organization (Nagekeo Regency) cooperated on a salt farm improvement project (development of 2,100 ha) around the irrigation facility extension area, in accordance with the Indonesian Ministry of Industry's plan to increase domestic salt production. The salt manufacturing company and the local government had signed an MoU in 2010. In April 2011, a meeting of the concerned parties (executives from multiple regencies, the salt manufacturing company, the Ministry of Industry, BBWS, East Nusa Tenggara provincial government, etc.) was held, and at the discretion of the Nagekeo Regency, an agreement was reached with the salt manufacturing company to prepare approximately 1,000 ha of land for the development of a salt mill. Based on this, the DGWR issued a document (letter) to the governor of the regency, stating that 864 ha of the estimated beneficiary area in the Mbay Kiri subproject could be utilized for the salt farm project. Points (a)–(c) were agreed upon as it was deemed to be more profitable for farmers to use the land for the salt-production project than to use it for agriculture. (The landowners agreed, and it is possible that the DGWR had to forgo some of the irrigation projects at that time).

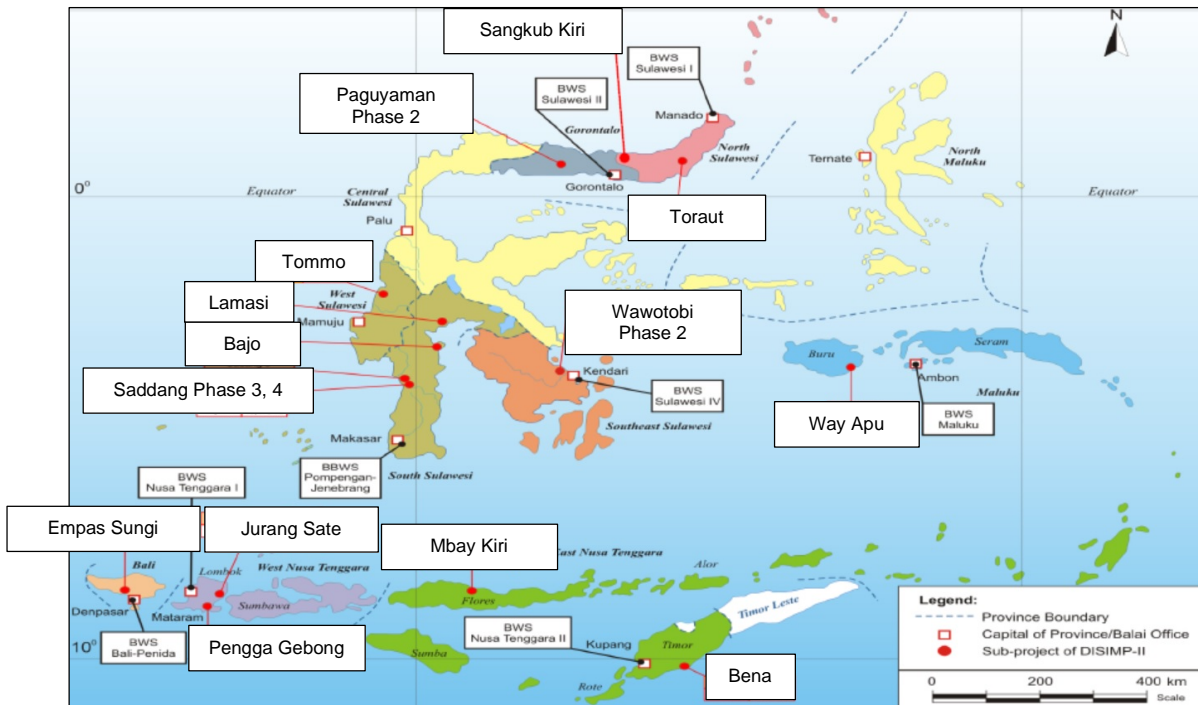
As a result of these changes and increases/decreases of the subprojects and the increase/decrease of the area benefiting from the project, the actual area increased to 94,933 ha, as opposed to the initial plan of 81,600 ha.

2) Consulting Services

This was mostly implemented as planned. As mentioned above, the service period was extended because the Sangkub Kiri subproject was implemented as an additional subproject and because the consulting service was provided for the works associated with the expansion of the project area.

3) Strengthening of WUAs, Water Management, Asset Management

This was mostly implemented as planned. From 2011 to 2014, the staff of the River Basin Organization for basins under the Central Government or Balai Besar Wilayah Sungai (hereinafter referred to as “BBWS”) and the River Basin Organization or Balai Wilayah Sungai (hereinafter referred to as “BWS”), which are the local agencies of the DGWR, attended training on improving the maintenance of irrigation facilities and strengthening irrigation water management and asset management. This was implemented as part of the consulting services.



Source: Project Completion Report

Figure 1: Locations of the Project Sites

3.2.2 Project Inputs

3.2.2.1 Project Cost

At the time of the appraisal, a total project cost of 18,200 million yen (of which the ODA loan was 8,967 million yen) was planned. On the other hand, the actual total cost was 13,961 million yen (of which the ODA loan was 8,591 million yen), which was lower than planned (approximately 77% of the plan). The main reason for this was the fluctuation of exchange rates (strong Japanese yen/US dollar, weak rupiah) during the expenditure period (2009–2016) for land acquisition, consulting services and civil engineering works over the course of the project implementation.

3.2.2.2 Project Period

Table 3 shows the initial plan and the actual project period. At the time of the appraisal, the project was planned from March 2008 to March 2013, a duration of five years and one month (61 months).⁸ However, the actual period was from March 2008 to June 2016, a duration of eight years and four months (100 months), approximately 164% of the initial plan. The main reasons for this were as follows: 1) it became necessary to review the plan at the detailed design stage, which required extra time; 2) in some subprojects, negotiations with the landowners took more time with regard to land acquisition;⁹ 3) during the project implementation, many subprojects were affected by heavy rain and floods, which delayed the construction periods, etc.

Table 3: Initial Plan and Actual Project Period

	Initial Plan	Actual Project Period
(Whole Project)	March 2008–March 2013 (61 months)	March 2008–June 2016 (100 months)
1) Consulting Services (including the selection period)	April 2008–March 2013 (60 months)	November 2008–June 2016 (92 months)
2) Land Acquisition	January 2009–March 2010 (15 months)	January 2009–October 2015 (82 months)
3) Tendering and Contracting	December 2008–June 2010 (19 months)	March 2009–February 2012 (36 months)
4) Civil Engineering Work	September 2009–September 2012 (35 months)	September 2009–February 2016 (78 months)
5) Strengthening of WUAs, Water Management and Asset Management	January 2009–March 2013 (51 months)	July 2010–December 2015 (66 months)

⁸ At the time of the appraisal, the completion time of this project was set as “the end of the warranty period.”

⁹ Especially regarding the Way Apu subproject, which encompasses areas where Indigenous people reside, significant time was spent confirming and negotiating land ownership. The land acquisition relating to other subprojects will be explained in 2) Resettlement and Land Acquisition in 3.3.2.2. under Impact section.

6) Warranty Period	March 2012–March 2013 (13 months)	December 2010–June 2016 (67 months)
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Source: Documents provided by JICA (initial plan), Project Completion Report (and answers to the questionnaire (actual))

3.2.3 Results of Calculations for Internal Rates of Return (Reference only)

Economic Internal Rate of Return (EIRR)

At the time of the appraisal, the EIRR was calculated to be 15.4%, setting the increase in terms of net agricultural income as a “benefit,” and the project cost and operation and maintenance cost as “costs,” with a project life of 30 years. This study attempted to recalculate the EIRR at the time of the ex-post evaluation, applying the same conditions as at the time of the appraisal, however, an accurate rate could not be derived. The reasons are: 1) the basis for the EIRR calculation relating to the 14 subprojects at the time of appraisal could not be confirmed and 2) the “benefit (increase in net agricultural income)” was not calculated when changes were made to certain subprojects during the project implementation. On the other hand, the actual project cost, which accounts for a large proportion of the “cost,” was within the initial plan and the targets for the cropping intensity and rice production, as will be explained in 3.3.1.1 Quantitative Effects (Operation and Effect Indicators), were either mostly achieved or exceeded. Considering this, it is possible that the EIRR is higher than 15.4%, the rate calculated at the time of the appraisal.

<Summary of Efficiency>

As discussed above, the outputs of this project were almost as planned and the project cost was within the plan. However, the project period significantly exceeded the plan, therefore, efficiency of the project is moderately low.



Branch Point of the Primary and the Secondary Canal
(Mbay Kiri Subproject)



Developed Intake Weir
(Way Apu Subproject)

3.3 Effectiveness and Impacts¹⁰ (Rating: ③)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

Table 4 shows the quantitative effect indicators (baseline, target, actual values) related to this project.

Table 4: Quantitative Effect Indicators of This Project (Baseline, Target, Actual Values)

Indicator *Note 1	Baseline value 2007			Target value 2018 [5 Years After Completion]			Actual value 2021 [5 Years After Completion]		
1) Area benefiting from the project (unit: ha)	70,255			81,600			94,933		
2) Cropping intensity *Note 2 (unit: %/year)	161			210			206.41 *Note 4		
3) Rice production (unit: ton/year)	464,946			660,306			897,117 *Note 5		
4) Rice yield (unit: ton/ha/season)	Renovation	Extension	New	Renovation	Extension	New	Renovation	Extension	New
	Wet season	Wet season	Wet season	Wet season	Wet season	Wet season	4.7 *Note 6	4.2 *Note 6	2.7 *Note 6
	Dry season	Dry season	Dry season	Dry season	Dry season	Dry season			
	3.9	3.0	2.9	4.6	4.5	4.5			
5) Rate of WUA presence *Note 3 (unit: %)	63 (Existing irrigation facilities)			100 (Renovation, extension, new construction)			80.5 (Renovation, extension, new construction) *Note 7		

Source: documents provided by JICA (baseline, target), questionnaire answers and the Project Completion Report (actual)

Note 1: The total values of the renovation, extension and new construction are shown for the (1) area benefiting from the project and (3) rice production in terms of the quantitative effect indicators. The values for the (2) cropping intensity, (4) rice yield and (5) rate of WUA presence are averages.

Note 2: Cropping intensity becomes 100% or higher if more than one single cropping is realized in the irrigated area.

Note 3: This indicator is for ensuring good operation and maintenance.

Note 4: In this survey, a questionnaire was sent to the personnel involved in each subproject through the DGWR headquarters and the numbers in the answers were summarized. Of the 15 sites, 13 sites provided responses. The actual value represents the average of the numbers collated. Two sites, the Pengga Gebong and the Jurang Sate subprojects (both were renovations) did not send replies.

Note 5: Similarly, 13 of the 15 sites sent replies. The actual value represents the sum.

Note 6: Similarly, 13 of the 15 sites sent replies. The actual value represents the average. New construction was at one location, the Tommo subproject. The landslide which occurred near this subproject in 2016 affected the primary and secondary canal facilities. As a result, the actual value was low at 2.7 ha. However, repair works are expected to be completed by the end of 2022.

Note 7: Ten of the 15 sites sent replies. The rate of each irrigation subproject was calculated by dividing the number of

¹⁰ Sub-rating for Effectiveness is to be put with consideration of Impacts.

organized WUAs by the number of planned WUAs. The average of the 10 sites is listed as the actual value. (The Pengga Gebong, Jurang Sate and Toraut subprojects did not send replies. The Bena and Mbay Kiri subprojects were excluded as they replied before the project began, therefore, accurate data at that time were unclear and impossible to calculate).

Five indicators were established to measure the effect at the time of the appraisal, as shown in Table 4. In addition, the target year was set five years after completion.¹¹ As the actual completion was in 2016, five years later, the actual data for 2021 were collected. Analyses of each indicator are shown below:

1) Area Benefiting from the Project¹²

As discussed in 3.2.1 Project Outputs under Efficiency, the actual area benefiting from the project was 94,933 ha, which exceeded the target, as a result of the changes made to the subprojects and the increase/decrease in the area benefiting from the project. (However, as this is the result of the changes and the corresponding increase/decrease, a comparison and verification of the project effect are not necessarily accurate).

2) Cropping Intensity

The actual value was almost as per the target, showing that rice is grown twice a year (or even three times a year depending on the subproject/field) in many subprojects.

3) Rice Production

The actual value exceeded the target. The reasons for this include the expansion of the area benefiting from the project due to the renovation, extension and new construction of the irrigation facilities, and the increase in cropping intensity. According to the DGWR, the other factor is that the quality of the fertilizer, etc., has improved.

4) Rice Yield

The actual values are above the baselines and are mostly close to the targets. Although sufficient data were not available by season (dry or wet), it was confirmed through interviews with subproject personnel that the yield did not change significantly from the dry season to the wet season and that it had been increasing. Apart from the increase in cropping intensity, the improvement in quality of the fertilizer, etc., can also be a factor. The reason why new construction (Tommo subproject) became a low value at 2.7 ha is that a landslide occurred near this subproject in 2016 affected the primary and secondary canals. As a result, this region was still in the process of recovery at the time of the ex-post evaluation, although restoration work is progressing. The restoration work is expected to be completed by the end of 2022 and the yield is expected to increase thereafter.

¹¹ A time of “5 years after the completion” was set probably because a build-up period after the construction of the irrigation facility was anticipated. In other words, it was considered that expanding the cultivated area and securing yields would require a certain period of time.

¹² The definition of an “area benefiting from the project” is an area where the effects of irrigation development and renovation have been effective and can be regarded as an area based on the design. (Reference information: “cultivated area” is the area where planting is actually carried out).

5) Rate of WUA Presence

This indicator shows that with functioning WUAs, daily maintenance work is expected to be performed systematically, rice fields are expected to be maintained and expanded, cropping is expected to be well managed and problems are expected to be solved. Although the actual value did not reach the target, it is above the baseline and accounts for around 80% of the target. The support from the consulting services of this project (strengthening the capacity to operate and maintain irrigation facilities, strengthening WUAs, water management and asset management) is deemed to have assisted in this matter. In fact, some WUAs were institutionalized (incorporated) during the project implementation, while others are still in the process of institutionalizing. In other words, even though institutionalization is taking time, the rate of WUA will be even higher in the future once the process is completed.

3.3.1.2 Qualitative Effects (Other Effects)

(Stable Supply of Irrigation Water, Increase in Agricultural Income with a Focus on Rice)

As a result of interviews with the WUA staff (farmers) of the Lamasi, Saddang, Tommo, Way Apu, Bena and Mbay Kiri subprojects visited during this field survey, the following comments were received.

(Common Comments from Many Subprojects)

“Due to the development and renovation of the irrigation facilities, the working hours required for water intake, cultivation and harvesting have been reduced and the labor force has decreased;”
“The quality of the irrigation water is good;” “Rice yield has increased. It used to be 4.0 ton/ha/season and has increased to 5 to 7 tons/ha/season;” “The volume of distributed water and cultivation has been stabilized and production of rice is increasing.”

(Way Apu Subproject)

“Revenue from the rice harvest has increased. Previously, the gold mining industry was more profitable than rice cultivation. However, as mining is declining and after hearing that water distribution is stable, due to the development of irrigation facilities, many people are returning to rice cultivation;” “It became possible to grow rice twice or three times a year. No more trouble with water distribution in the dry season.”

(Bena Subproject)

“While stable cultivation on terminal agricultural land requires further improvement of water management skills under the stable water distribution condition, yields are currently doubling by comparison with previous yields;” “Cultivation based on the agricultural calendar has been possible over the last two years;” “Farmers became able to access irrigation water easily and we think that labor has also been reduced;” “Revenue from the sales of rice increased.”

(Mbay Kiri Subproject)

“Before the start of this project, there were cases where farmers carried water themselves and sprinkled water on the fields, so you can say that the working hours were long. Now, the irrigation canal provides stable water distribution to the field;” “Farmers have easier access to irrigation water. Planting twice a year has been stable.”

(Lamasi and Saddang Subprojects)

“Profits depend on the production cost. As the selling price of rice in the market is fluid, the profit is not necessarily large.”

Based on the above comments, it can be inferred that irrigation water is stably supplied and it has become possible to grow rice twice a year; yields have increased and productivity has improved in the target subprojects. On the other hand, in some cases, the situation concerning agricultural incomes depend on the subproject.¹³



Drainage Canal
(Tommo Subproject)



Secondary Canal
(Saddang Subproject)



Status of the Field
(Bena Subproject)

¹³ Many farmers in the Bena and Mbay Kiri subprojects in East Nusa Tenggara Province have a tendency of selling rice directly to customers. (This is not limited to the two subprojects but many farmers in East Nusa Tenggara Province polish harvested rice and sell it to customers. On the other hand, in other areas (e.g., Sulawesi Province), it is common for farmers to take paddy rice to the market and sell it to middlemen). Relatively high profits can be obtained by eliminating middlemen and market commissions. Farmers in both subprojects confirmed when asked that rice was traded for 7,500–10,000 rupiah per kg. It was also confirmed that many farmers were increasing their profits compared with the period before the start of the project. On the other hand, it was also confirmed that farmers are affected by the market price at the time of rice sales and that profits did not necessarily increase in some subprojects. In the Lamasi subproject, for example, the purchase price in the market in one instance was 3,800 rupiah per kg (the price after deducting the commissions of dealers and buyers; the actual payment is in kind—rice), while the production cost was 4,200 rupiah per kg. As mentioned above, although the quality of fertilizers has improved, these input costs have been on the rise in recent years along with other types of inflation, putting pressure on farmers’ profits and sometimes unintentionally reducing profits. A similar case was confirmed in the Saddang subproject. In the Lamasi subproject, however, it is unlikely that profits are constantly declining, as some farmers there maintained that they earned an average profit of 1 million rupiah per month. In addition, farmers working in this subproject region also have the opportunity to receive a production cost subsidy of 6 million rupiah per hectare annually. (Subsidies are only available if the farmer purchases fertilizer, therefore, not all farmers receive this annually).

3.3.2 Impacts

3.3.2.1 Intended Impacts

(Improvement in the Living Environment of Farmers in the Project Areas and Contribution to Poverty Alleviation)

This project was expected to contribute to the improvement in the living environment of farmers and poverty reduction, by realizing a stable supply of irrigation water and increased agricultural incomes mainly from rice. In this survey, BBWS/BWS and WUA staff (farmers) of the Lamasi, Saddang, Tommo, Way Apu, Bena and Mbay Kiri subprojects, which were visited during this field survey, were interviewed and the following comments were received: “My income increased, and I was able to utilize it to repair my home. I was able to secure savings to send my children to school and to cover the cost of going to a pilgrimage site (Mecca)” (Saddang subproject); “I was able to buy a moped bike, a four-wheeled vehicle and the latest farm equipment. I could secure the money to repair my home. I was able to save up to send my child to college” (Way Apu subproject); “The agricultural land area has expanded and rice production has increased. In the future, diversity of agricultural land use can also be expected¹⁴” (Lamasi subproject); “Local people are employed as maintenance staff for the irrigation projects. I think the improvement of rice productivity and locals obtaining jobs lead to the revitalization of the region” (Bena subproject); “Due to the land issue related to the salt production business, some development was postponed. However, the stable distribution of irrigation water, I think, is leading to improved yield and productivity, increased profits and regional revitalization” (Mbay Kiri subproject). Based on these comments, it is possible that many farmers have financial margins and are changing their livelihoods. It can be said that this project has contributed to an improvement in the living standards of farmers.¹⁵

For reference, Table 5 shows the Food Security Index (FSI)¹⁶ by province, including the eastern Indonesia region, and Table 6 shows the Global Food Security Index (GFSI) of Indonesia (nationwide). Although the indexes of both tables cannot be simply compared because they are affected by the characteristics of the local communities,¹⁷ the indexes of the provinces in the

¹⁴ While rice cultivation is the main focus currently, considering the stable water distribution situation, it is probable that such comments were made with the expectation of cultivating other highly cashable crops.

¹⁵ Although no specific comments were obtained regarding poverty reduction, based on the above comments, it is highly possible that farm households with low incomes before the start of this project, have also been given the opportunity to increase their incomes.

¹⁶ The level of food security is calculated by accumulating the points of each item based on 59 indicators that fall into the following four categories: “affordability,” “availability,” “quality and safety,” “resources and resilience.” (The maximum score is 100 points). The Economist magazine, commissioned by the agricultural research company, Corteva (USA), is coordinating it. In terms of world ranking, Indonesia in 2020 was 65th out of 113 countries. Western countries and Japan dominate the top ranks.

Source: <http://ekonomi.uma.ac.id/2021/03/16/indonesias-global-food-security-index/> (accessed on January 26, 2022)

¹⁷ Based on nine indicators in the regions, “ratio of per capita normative consumption to net availability,” “ratio of

eastern Indonesia region are generally rising and are also higher than the national index. It is inferred that the role of this project, which aimed to increase food (rice) production by renovating, extending and constructing irrigation facilities on agricultural land of 90,000 ha or more, is not small.

(Reference) Table 5: Food Security Index (FSI) by Province

Province (Subproject Within the Province)	2019	2020
Bali (Empas Sungai)	85.15	84.54
West Nusa Tenggara (Pengga Gebong, Jurang Sate)	62.43	75.60
East Nusa Tenggara (Bena, Mbay Kiri)	50.69	66.92
North Sulawesi (Toraut, Sangkub Kiri)	81.44	77.79
South Sulawesi (Saddang Phase 3, Saddang Phase 4, Lamasi, Bajo)	78.69	81.81
Southeast Sulawesi (Wawotobi Phase 2)	76.99	77.06
Gorontalo (Paguyaman Phase 2)	69.06	80.40
West Sulawesi (Tommo)	60.37	76.36
Maluku (Way Apu)	52.35	58.15

Source: Ministry of Agriculture of Indonesia (Indeks Ketahanan Pangan (FSI), Indonesia)

Note: Only 2019 and 2022 data were available.

(Reference) Table 6: Global Food Security Index (GFSI) of Indonesia (Nationwide)

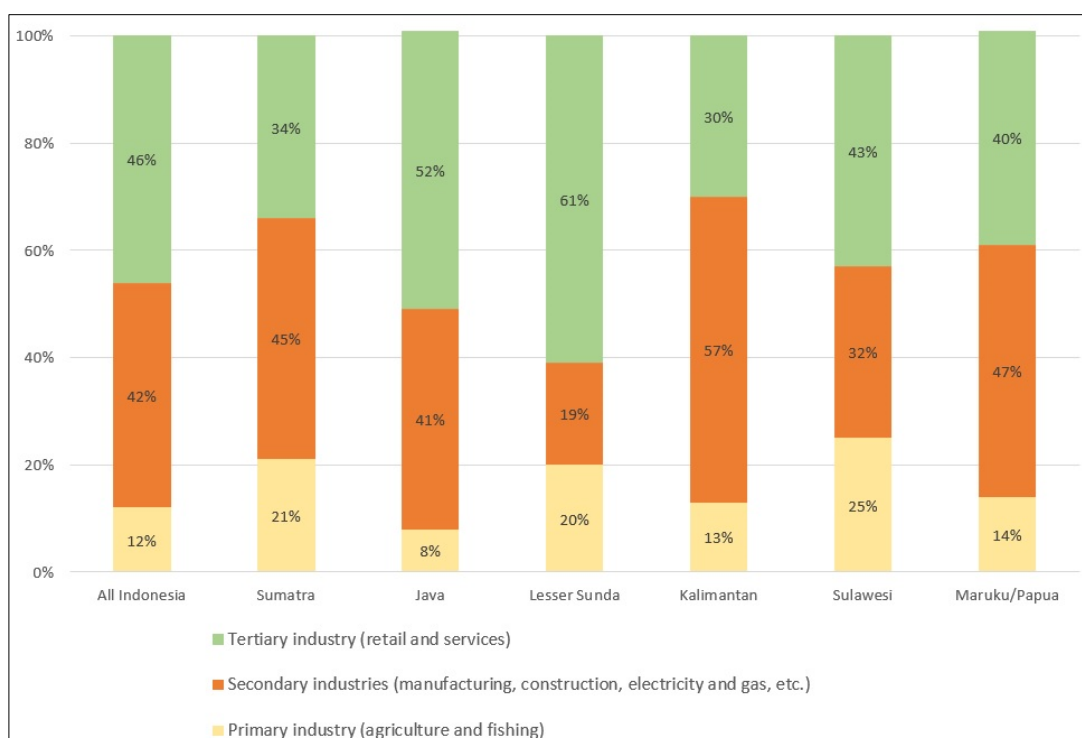
2012	2013	2014	2015	2016	2017	2018	2019	2020
46.8	45.6	46.5	46.7	50.6	51.3	54.8	62.6	59.5

Source: Economist Intelligence Unit

(Reference: Composition of Industries in Indonesia)

Figure 2 shows the most recent (2018) industry composition (primary, secondary and tertiary industry). The Lesser Sundas (East and West Tenggara Provinces, etc.), Sulawesi and Maluku in the figure are located in the eastern Indonesia region. In the region, the composition share of primary industry is higher than the national average, suggesting that most recently, the proportion of agriculture is higher in this region than the national average.

population living below the poverty line,” “ratio of households with food expenditure of 65% or more of total expenditure,” “ratio of households with no access to electricity,” “average school education period for women over 15 years old,” “ratio of households without access to safe water,” “ratio of total population per health worker to the population density level,” “ratio of infants below standard height” (stunting), “life expectancy at birth,” an index has been calculated based on the sensitivity level when measuring food and nutritional status, etc., while considering the data for a specific period (regularly available annually), including data from all local governments.



Source: *Investment Environment of Indonesia*, Japan Bank for International Cooperation (JBIC) (2018 data)

Figure 2: Industrial Structures in Each Region

In addition, Table 7 shows the Gross Regional Product (GRDP) of each province in the eastern region of Indonesia. The changes are shown from immediately after the start of this project (2010) and immediately before completion (2015), up until the time of the ex-post evaluation (2020). While simple comparisons are not possible, the GRDP is increasing in all provinces. Based on the comments obtained in the above interviews, it can be said that this project contributes to improving the living standards of farmers, and at the same time, supports the economic revitalization of the surrounding areas.

(Reference) Table 7: Gross Regional Product (Nominal GRDP)

(unit: 1 billion rupiah)

Province (Subproject Within the Province)	2010	2015	2020	Growth Rate over 11 Years
Bali (Empas Sungai)	93,749	176,413	224,214	239.16%
West Nusa Tenggara (Pengga Gebong, Jurang Sate)	70,123	105,665	133,522	190.41%
East Nusa Tenggara (Bena, Mbay Kiri)	43,847	76,121	106,506	242.91%
North Sulawesi (Toraut, Sangkub Kiri)	51,721	91,146	132,299	255.79%

South Sulawesi (Saddang Phase 3, Saddang Phase 4, Lamasi, Bajo)	171,741	340,390	504,479	293.74%
Southeast Sulawesi (Wawotobi Phase 2)	48,401	87,714	130,184	268.97%
Gorontalo (Paguyaman Phase 2)	15,476	28,493	41,726	269.62%
West Sulawesi (Tommo)	17,184	32,988	45,909	267.16%
Maluku (Way Apu)	18,429	34,346	46,264	251.04%
(Reference) Whole of Indonesia	1,643,267	2,790,273	4,014,112	244.28%

Source: Statistics Indonesia (BPS), Federal Reserve Economic Data¹⁸

3.3.2.2 Other Positive and Negative Impacts

1) Impacts on the Natural Environment

According to the *Japan Bank for International Cooperation Guidelines for Confirmation of Environmental and Social Considerations* (established in April 2002), this project was classified as Category B because its characteristics were unlikely to affect the environment and its areas were unlikely to be affected. Furthermore, when implementing the subprojects (each irrigation area), the Environmental Impact Assessment (EIA) and the environmental management monitoring and management method (UKL/UPL) were conducted and approved in accordance with Indonesian domestic law before construction began.

The questionnaire, site visits, interviews with the DGWR and the personnel involved in each subproject visited showed that no major problems have occurred in terms of the impact on the natural environment (air pollution, noise/vibration, impact on the ecosystem, etc.) in each subproject at the time of the ex-post evaluation. In each subproject, the environmental management department of each local government called Bapedal/Bandal is responsible for and implements environmental monitoring. It was also confirmed that no problems relating to air pollution, noise, vibration or water quality, etc., have been reported to date when carrying out environmental monitoring.

2) Resettlement and Land Acquisition

In this project, land acquisition occurred in four subprojects (the Pengga Gebong, Bajo, Tommo and Way Apu subprojects). The acquisition process was smooth in the Pengga Gebong and Bajo subprojects and was completed by the end of 2009. The area subject to land acquisition was 10 ha in each subproject. The status of the land acquisition in the Tommo and Way Apu subprojects are explained below. In both subprojects, the land acquisition process was lengthy and the construction period was delayed, thus, it can be said that there were certain problems.¹⁹ However,

¹⁸ Source: <https://fred.stlouisfed.org> (accessed on January 26, 2022)

¹⁹ As discussed in 3.2.1 Project Outputs under Efficiency, although the Mbay Kiri subproject was subject to land acquisition in the initial plan, negotiations with the landowners terminated. Considering the reduction in the irrigation area, one cannot exclude the possibility that communication and coordination between the project and stakeholders were not thorough from the time of the project formulation to the period after the start of the project.

the issues were resolved by the time of the ex-post evaluation.

- Tommo subproject: although the land acquisition was expected to proceed in line with the Indonesian government budget, it was not completed before construction of the main and secondary canals began. At the stage of a detailed design review (2010-2011), the location of the main canal was changed to avoid swamps and areas requiring deep dredging; this affected the land acquisition plan.²⁰ It took time for the DGWR to discuss the land acquisition budget with the provincial government and procedures within the provincial government were also delayed. As a result, construction started late (in December 2012). The total area that became subject to the land acquisition was 94.09 ha.

- Way Apu subproject: this is an area where many Indigenous people live. In 2015, there were tough negotiations over land in the lower reaches of certain secondary canals,²¹ which required extra time. As a result, construction was delayed, as it was affected by the fact that many landowners were against the land acquisition. The local government negotiated with the indigenous tribal chief and an agreement was finally reached. The total area that became subject to the land acquisition was 10.25 ha.

According to the DGWR, “with the cooperation of the project related personnel, the land acquisition was carried out in accordance with Indonesian law and the procedure included the identification of the people to be affected and the scheduling of a briefing session for them. There have been no complaints or incidents relating to the compensation since the completion of this project. Necessary compensation for all areas subject to land acquisition was paid before the start of construction. Most of the records of the landowners are kept by the local governments but the exact numbers were often not recorded. The process did not involve the relocation of any houses. No livelihood recovery support measures were implemented primarily because the land acquisition did not result in the loss of employment opportunities and it was not anticipated to lead to poverty in the case of those affected.” It was also confirmed that no relocation of residents was anticipated or took place in any of the subprojects implemented by this overall project.

3) Gender Equality, Vulnerable Groups/Human Rights, Social System Norms, People’s Well-being

It can be said that this project contributes to agricultural productivity and farm incomes in the eastern region of Indonesia and helps establish food security for the entire nation. While cases in which this project had a direct impact have not been confirmed and while the country is faced

²⁰ Specific information was not available as to how the land acquisition was finally agreed upon or in which area land could not be acquired in the Tommo subproject. This is because the local government’s building was destroyed by an earthquake in January 2021 and the relevant documents are missing.

²¹ The exact location is Way Lo Barah.

with population growth and economic revitalization, with food security being highlighted as an urgent issue, this project is playing a role in benefiting farmers who are beneficiaries (including the vulnerable) both extensively and equally, generating more choices in farmers' lives and creating events that lead to happiness. Considering the impacts that contribute to improving the living environment of farmers, no particular negative impacts on gender equality, vulnerable groups/human rights, social system norms and people's well-being are in evidence.

<Summary of Effectiveness and Impacts>

Comprehensively considering the above, the outcomes and impacts expected from the implementation of this project have been achieved almost as planned. In addition, it can be concluded that there are hardly any negative impacts, on a long-term basis, from social (gender equality, vulnerable groups/human rights, social system norms, people's well-being), environmental or economic perspective. Therefore, effectiveness and impacts of the project are high.

3.4 Sustainability (Rating: ②)

3.4.1 Policy and System

According to the *National Medium Term Development Plan (RPJMN)* developed by the government of Indonesia, the government lists improving agricultural productivity, agricultural access and agricultural quality as priorities. In addition, the *2020-2024 Agricultural Strategic Policy* aims to improve agricultural productivity nationwide, while reelected President Joko Widodo published the *Food Estate Program*, aiming to secure food supply and to break the dependence on food imports. This project contributes to the improvement in agricultural productivity and food security, therefore, it can be said that the project is consistent with the policy and direction of the Indonesian government still at the time of the ex-post evaluation.

3.4.2 Institutional/Organizational Aspect

The executing agency is the DGWR (headquartered in Jakarta). The DGWR is responsible for flood control, water resource development and the planning and implementation of irrigation projects, as well as operation and maintenance.

Concerning the operation and maintenance of the irrigation facilities developed and renovated by this project (weirs, headworks, primary canals, secondary canals, tertiary canals, etc.), this may differ depending on the situation faced by each province and subproject. Nevertheless, in principle, the DGWR is responsible for irrigation facilities with 3,000 ha or more in a beneficiary area (i.e., other than the terminal irrigation facilities), while provincial governments are in charge of irrigation facilities with more than 1,000 ha and less than 3,000 ha (i.e., other than the terminal

irrigation facilities). Regencies are responsible for facilities of 1,000 ha or less. As for the financial source of operations and maintenance, each institution covers the cost. Many of the subprojects within this project have a beneficiary area of 3,000 ha or more, therefore, they are under the DGWR. However, its local branches, the BBWS/BWS, carry out the operation and maintenance under the supervision of the DGWR headquarters. The BBWS/BWS has established a system of cooperating with the provincial governments under which each subproject exists. In addition, the WUAs operate and maintain the terminal irrigation facilities that are tertiary canals or smaller, with the support of the DGWR and the local governments.²² Regular maintenance works include repairing waterways and sluices where water leakage occurs, the painting of structures such as irrigation canals and weirs and daily maintenance work such as weeding (multiple times a month), cleaning and dredging of waterways.

When visiting the Lamasi, Saddang, Tommo, Way Apu, Bena and Mbay Kiri subprojects, some BBWS/BWS members commented that the number of the operation and maintenance staff was insufficient.²³ On the other hand, it was reported that the number of staff in the WUAs was generally sufficient. There was no particular case of outsourcing the operation and maintenance work to private companies. However, cases were confirmed whereby certain BBWS/BBS hired local residents for maintenance works.²⁴

From the above, no serious problems have been observed in the operation and maintenance system/organization at the time of the ex-post evaluation, however, it is considered necessary to steadily respond to operation/maintenance needs, by increasing the number of BBWS/BWS staff in certain subprojects.

3.4.3 Technical Aspect

Regarding the technical aspects of operation and maintenance, the operation and maintenance staff seemed to have sufficient skills, knowledge and experiences in the view of the BBWS/BWS, which has jurisdiction over the Lamasi and Way Apu subprojects that were visited in this field survey. On the other hand, it was observed that management skills were not necessarily adequate in the Tommo, Saddang, Bena and Mbay Kiri subprojects. Specifically, comments were received that knowledge and skills, for water flow calculation and water distribution management were lacking and that training in such fields was necessary.²⁵

²² Of the actual values explained in 5) Rate of WUA Presence under 3.3.1.1 Quantitative Effects (Operation and Effect Indicators), in areas where WUAs have not been established (i.e., not yet been formed or in the process of being established), the BBWS/BWS is carrying out the work in principle.

²³ For example, various answers were received such as, “there are not enough staff for the required maintenance work. There is a shortage of water gate guards (gate keepers), but the number is expected to increase by the end of 2022.”

²⁴ Local residents are employed when irrigation canals need to be maintained quickly (intensively).

²⁵ For example, a comment was received from an individual involved in the Tommo subproject, “proper water management is required to distribute the required amount of water to the field via the irrigation canal without waste.

Although no specific answers were obtained regarding the years of work experience of the BBWS/BWS staff, it seemed that the average was 5 to 10 years. The situation appeared to be different among the WUAs, however, it was confirmed that due to the nature of the operation and maintenance work, a high degree of specialization was not particularly required.²⁶

On-the job training (OJT) for newly hired recruits at the BBWS/BWS and WUAs is provided in some cases but not all. This is also true with regard to the training of general staff. Training conducted in recent years relate to the “operation and management of irrigation facilities,” “on-site technical training for irrigation canal managers” and “headwork O&M training,” etc., attended by BBWS/BWS staff. In many subprojects, the BBWS/BWS have meetings with WUA members before they start planting every year to discuss operations and maintenance and the planting policy. The BBWS/BWS also provide WUA members with operation and maintenance-related training as required.

Based on the above, there are no serious problems on a technical level concerning operations and maintenance, however, there appear to be some issues in certain subprojects.²⁷

3.4.4 Financial Aspect

The financial resource for the DGWR’s operation and maintenance budget is part of the government budget. The operation and maintenance budget for the BBWS/BWS in various parts of Indonesia is allocated by the DGWR headquarters. Table 8–13 show the operation and maintenance budget and actual cost (latest three years) of the subprojects visited during this field survey.

However, the amount of water for distribution and cultivation management is considered to vary, depending on the characteristics of the subproject. By having an understanding of the amount of water, it is possible to ascertain the accurate agricultural management status, in particular, the actual situation regarding the terminal agricultural land below the tertiary canal becomes clearer. In this subproject, we wish to acquire such knowledge and will work to understand the field.” However, such training had not been carried out at the time of the ex-post evaluation.

²⁶ Regarding the educational background of the staff, in almost all subprojects, the BBWS/BWS staff have a university degree or higher and WUA staff are mostly high school graduates.

²⁷ In this project, as part of the consulting services, which is one of the project components, “strengthening of WUAs, water management and asset management” was implemented in order to strengthen irrigation facility maintenance and irrigation water management. With the recruitment and selection of on-site staff, the formation of organizations and systems, training and OJT for on-site staff and asset management, as well as training for office work, techniques, systems, water distribution management and the maintenance of irrigated water distribution networks was conducted. Although the situation may vary depending on the subproject, based on the information gathered from interviews held within the subprojects, it appears that staff retention and skill/knowledge improvement were not necessarily sufficient at the time of the ex-post evaluation.

Table 8: Operation and Maintenance Budget and Actual Cost of the Bena Subproject
(unit: 1,000 rupiah)

	2018	2019	2020
Operation and Maintenance Budget	2,320,250	1,108,879	1,347,841
Actual O&M Cost	2,310,617	1,088,409	1,339,700

Source: Answers to the questionnaire and interview responses

Table 9: Operation and Maintenance Budget and Actual Cost of the Mbay Kiri Subproject
(unit: 1,000 rupiah)

	2018	2019	2020
Operation and Maintenance Budget ²⁸	1,866,332	1,985,000	295,080
Actual O&M Cost	1,861,900	1,858,625	287,997

Source: Answers to the questionnaire and interview responses

Table 10: Operation and Maintenance Budget and Actual Cost of the Tommo Subproject
(unit: 1,000 rupiah)

	2018	2019	2020
Operation Budget	5,290	60,000	50,000
Actual Operation Cost	5,290	59,928	49,986
Maintenance Budget	N/A	111,970	126,556
Actual Maintenance Cost	N/A	111,970	126,472

Source: Answers to the questionnaire and interview responses

Table 11: Operation and Maintenance Budget and Actual Cost of the Lamasi Subproject
(unit: 1,000 rupiah)

	2018	2019	2020
Operation Budget	976,581	974,099	1,023,764
Actual Operation Cost	937,235	933,225	990,312
Maintenance Budget	2,703,183	2,831,000	1,959,499
Actual Maintenance Cost	2,272,287	2,631,902	1,923,474

Source: Answers to the questionnaire and interview responses

Table 12: Operation and Maintenance Budget and Actual Cost of the Saddang Subproject
(unit: 1,000 rupiah)

	2018	2019	2020
Operation Budget	5,906,907	6,044,947	6,354,092
Actual Operation Cost	5,612,743	5,716,286	6,267,374
Maintenance Budget	10,942,679	12,585,791	12,712,054
Actual Maintenance Cost	10,254,950	11,675,634	11,502,794

Source: Answers to the questionnaire and interview responses

²⁸ In both the Bena and Mbay Kiri subprojects, the operation budget, maintenance budget and the actual costs are the sum of the accounting expenses.

Table 13: Operation and Maintenance Budget and Actual Cost of the Way Apu Subproject
(unit: 1,000 rupiah)

	2018	2019	2020
Operation Budget	129,600	129,600	216,000
Actual Operation Cost	129,600	129,600	216,000
Maintenance Budget	240,705	240,800	54,720
Actual Maintenance Cost	240,705	240,800	54,720

Source: Answers to the questionnaire and interview responses

Bena subproject and Mbay Kiri subproject: it was reported that the necessary budget was allocated. On the other hand, it was also shared that COVID-19 measures have been given priority in the budget allocation for public projects in recent years, and there has been a trend of budget cuts in other areas.

Tommo subproject: it was reported that the necessary budget was generally allocated and that the minimum maintenance work necessary was being conducted. However, it was mentioned that the amount of work was not necessarily substantial.

Lamasi subproject and Saddang subproject: it was reported that, in general, a sufficient budget was allocated. The maintenance budget and the actual cost decreased slightly from 2019 to 2020 because there was a budget cut for public works due to COVID-19. It was shared that “planned staff training was canceled” as a consequence.

Way Apu subproject: the operating budget and the actual cost increased from 2019 to 2020, due to measures taken in response to the rise in wage levels of the local community. The maintenance budget and actual cost decreased from 2019 to 2020 because the regular maintenance of other irrigation areas (other than the area covered by this project) required more of the budget than expected, which altered the budget allocation. According to personnel involved in the subproject, “although the operation and maintenance budget has generally been sufficient for the required work, sometimes the budget is reduced in the middle of the fiscal year. Therefore, staff members are trying to use the budget appropriately and carefully.” Regarding COVID-19, there has been virtually no effect.²⁹

From the above, the mechanism is in place to ensure the necessary operation and maintenance budget is allocated, and the actual results were observed. However, certain subprojects have

²⁹ (Reference information). Regarding COVID-19 and the government budget for 2020, there were many cases of budget cuts other than in the Ministry of Health and the Ministry of Education and Culture in Indonesia. Most of the budget, whether it is allocated to the central or local government, tended to be earmarked for COVID-19 measures. While the situation is similar in 2021, the Indonesian government seems to be focusing on economic recovery, as well as on measures against COVID-19.

recently faced budget cuts due to COVID-19. Therefore, it can be said that there are some issues with the current financial outlook.

3.4.5 Environmental and Social Aspect

Other than the fact that the land acquisition required time, the questionnaire and interviews conducted during site visits have confirmed that no special environmental or social mitigation measures were taken at the time of the ex-post evaluation, therefore, no impact is expected for the time being. As discussed in 3.3.2.2 Other Positive and Negative Impacts, it is believed that there had been no significant negative impacts up until the time of the ex-post evaluation.

3.4.6 Preventative Measures to Risk

At the time of the ex-post evaluation, no deterioration in the political situation or security in the eastern region of Indonesia had been reported. There have been no major changes in the central government's national development plan, agricultural sector plans or policies regarding the direction of irrigation facilities. As discussed in 3.1.1.2 Consistency with the Development Needs of Indonesia, the Indonesian government is developing and improving existing agricultural infrastructure facilities nationwide in order to strengthen the food security sector. In the *Food Estate Program*, apart from the North Sumatra province and South Sumatra province in the western region, the East Nusa Tenggara province and Papua province, etc., in the eastern region are listed as regions that are expected to become centers for agriculture, which is evidence that there is no change in the policies related to the agricultural sector and the development of irrigation facilities. In addition, no particular risks, external conditions or events that need to be controlled were observed, including at the present time and in the future.

3.4.7 Status of Operation and Maintenance

It was confirmed that no major problems have occurred within the developed and renovated irrigation facilities (weirs, headworks, primary canals, secondary canals, tertiary canals, etc.). Necessary operation and maintenance works are being carried out (implemented according to the budget and the number of staff) in the Lamasi, Saddang, Tommo, Way Apu, Bena and Mbay Kiri subprojects that were visited in this survey.

As mentioned earlier, a landslide occurred near the Tommo subproject in 2016, which affected the primary and secondary canals. At the time of the ex-post evaluation, the restoration work was on-going, financed by the government budget.

Regarding spare parts, it was observed that there were different procurement and storage responses depending on the subproject. In one case, a certain number of parts were stored in a warehouse and used when needed, while in another, parts were purchased immediately from a

local vendor or market when the supply was low (since purchasing and procuring parts is easy and not time consuming). It was confirmed that in any case there was no international procurement or any particular barriers/problems in the procurement process. It was also confirmed that in no case was maintenance compromised due to a lack of parts.

<Summary of Sustainability>

Based on the above, there seems to be no major concern regarding the sustainability of the effects generated by this project. On the other hand, the organizational structure (mainly personnel system), technology and financing of the operation and maintenance is not necessarily problem-free. Therefore, sustainability of the project effects is moderately low.



Water Diversion Point from the Intake Weir
(Way Apu Subproject)



Group Interviews with BWS and WUA Members
(Mbay Kiri Subproject)

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project aimed to increase food production, such as rice, in the nine eastern provinces of Indonesia, by renovating, extending and newly constructing irrigation facilities and by assisting the development of operation and maintenance systems, thereby improving food security and the incomes of farmers in the target region. This project has “consistency with the development plan” and “consistency with the development needs.” As for coherence, “consistency with Japan’s ODA Policy” can be confirmed. On the other hand, no concrete cooperation was expected in relation to “internal coherence” at the time of the appraisal and “external coherence” has not been confirmed as there is no cooperation, due to the fact that the target areas of this project are different from those of other donors. Therefore, its relevance and coherence are high. Regarding efficiency, the outputs were mostly as planned, and the project cost was within the plan. However, the project period significantly exceeded the initial plan, due to land acquisition procedures and heavy rains

and floods that delayed the construction process. Therefore, efficiency of the project is moderately low. Regarding effectiveness and quantitative effect indicators, the “area benefiting from the project” and “rice production” exceeded the targets, while “cropping intensity,” “rice yield” and the “rate of WUA presence” almost reached the targets or exceeded the targets. It was confirmed during the interviews that this project has resulted in an increase in rice production and frequency of planting, and depending on the subproject, farm incomes have increased and labor (agricultural work) has been reduced, owing to the supply of more efficient irrigation water. Similarly, regarding impacts, it was observed that the living environment of farmers has improved. As the food security index of each province is high, in which the subprojects targeted by this project are located, it can be inferred that this project has contributed to the stable supply of rice and to the improvement of self-sufficiency. Therefore, effectiveness and impacts of the project are high. Regarding sustainability, while no major concerns have been observed, it has been noted that certain issues exist in the institutional/organizational (mainly personnel system), technical and financial aspects of operation and maintenance. Therefore, the sustainability of the project is moderately low.

In light of the above, this project is evaluated to be satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

None.

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

Importance of Coordination from an Early Stage for Land Acquisition, Need for Information Sharing, Mutual Confirmation and Thorough Coordination among Project Personnel and Stakeholders

In the Tommo and Way Apu subprojects, the construction of irrigation canals was delayed as a result of the land acquisition problem. Perhaps the executing agency should have handled the negotiations by initiating discussions with the residents prior to the start of the project, identifying the coordinating ability and influence of the local governments and the local community leaders at an early stage, working closely with them, and taking the necessary measures (e.g., encouraging local governments to exercise patience when holding discussions with residents). When formulating similar projects in the future, if any difficulty is expected in terms of land acquisition at an early stage following the start of the project, the relevant organizations should implement

coordination and forecasting measures as soon as possible prior to negotiation. In the Mbay Kiri subproject, the land acquisition negotiation was terminated and the irrigation area shrank. From the time of the project formation to the period after the start of the project, it was necessary to confirm the status of the project site with the project personnel and the stakeholders, demonstrating effective communication and coordination. When formulating similar projects in the future, it would be desirable to consider significant information sharing, mutual confirmation and thorough coordination for a smooth project implementation.

Usefulness of Examining the Timing of the Realization of Project Effects with a Focus on the Ex-Post Evaluation and Establishing a System Suitable for Measuring the Effects at the Time of Project Planning

Regarding the effectiveness and quantitative effect indicators (area benefiting from the project, cropping intensity, rice production, rice yield and extent of WUA presence), the timing of measuring the effects was expected to be five years after the completion of the project. Usually, ex-post evaluations are conducted two to three years after completion, however, in this case a slightly longer time period was set, that is five years after the completion of the project. Consideration may have been given to the fact that it would take a certain period of time to expand the cultivated land area and to secure additional yield through the development and renovation of the irrigation facilities. In other words, a build-up period was assumed at the appraisal stage. In this way, a series of changes—the stable supply of water, an increase in the frequency of planting, the expansion of the cultivated land area and the securing of a stable yield—can be determined within the timeframe of five years, which can lead to a more accurate evaluation of the project effects. On the other hand, there can also be an adverse effect with regard to postponing the measurement and confirmation of the project effects. For example, (within five years after completion) the number of times that rice is grown in a year and the corresponding yield may decrease, due to natural and meteorological conditions or sudden disasters such as landslides, as in the case of the Tommo subproject. Due to factors other than this project, it may become difficult to determine the effects of the project. When formulating similar projects in the future, it would be realistic and necessary to set indicators appropriately and measure the effects at appropriate times, based on the actual situation of the irrigation area. While this should be the basic approach, it is also considered meaningful to consider the advantages and disadvantages of the timing of project effect measurement and confirmation at the project planning stage. It is worth considering the establishment of a system in which the effects are measured and monitored two to three years after completion of the project if possible, thereafter measuring the effects again when the timing is deemed appropriate, and whether the project has been affected by any external factors, etc.

5. Non-Score Criteria

5.1 Performance

5.1.1 Objective Perspective

When dealing with multiple subprojects, those involved in the project (DGWR, BWS/BBWS) took measures to ensure that the process of land acquisition and tendering for contractors would proceed without delays, so that the construction period would not be extended. Nevertheless, the land acquisition procedure and negotiations were lengthy and delayed the project period; in some sites there was a reduction in the area benefiting from this project (reduction in the project scope) as discussed above. However, there were no major faults in the project supervision system of the DGWR or JICA, and no particular problems were reported in terms of communication between the two parties.

5.2 Additionality

None.

(end)

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
1. Project Outputs	<p>1) Civil Engineering Work, etc. Renovation, extension, new construction of irrigation facilities (weirs, headworks, primary canals, secondary canals, tertiary canals, etc.) → 14 sites: the total area benefiting from the project is 81,600 ha</p> <p>2) Consulting Services Tendering assistance, construction supervision, support for strengthening irrigation facility operation and maintenance capacity (strengthening government-affiliated organizations and WUAs, water management (including farming support), asset management, etc.), project evaluation and monitoring, project implementation assistance, etc.</p> <p>3) Strengthening of WUAs, Water Management and Asset Management The executing agency and local government lead the strengthening of irrigation facility maintenance and irrigation water management. The ODA loan consultants assist and supervise.</p>	<p>1) Civil Engineering Work, etc. Renovation, extension, new construction of irrigation facilities (weirs, headworks, primary canals, secondary canals, tertiary canals, etc.) → <u>Implemented almost as planned (15 sites, the total area benefiting from the project is 94,933 ha. (Breakdown: new construction 2,500 ha, renovation 80,390 ha, extension 12,043 ha, total 94,933 ha))</u></p> <p>2) Consulting Services → <u>Implemented almost as planned (however the service period was extended)</u></p> <p>3) Strengthening of WUAs, Water Management and Asset Management → <u>Implemented almost as planned</u></p>
2. Project Period	March 2008–March 2013 (61 months)	March 2008–June 2016 (100 months)
3. Project Cost Amount Paid in Foreign Currency	185 million yen	260 million yen
Amount Paid in Local Currency	18,015 million yen	13,701 million yen
Total	18,200 million yen	13,961 million yen

(ODA Loan Portion)	(8,967 million yen)	(8,591 million yen)
Exchange Rate	1 USD = 122 yen, 1 rupiah = 0.0133 yen (As of September 2007)	1 USD = 96.79 yen, 1 rupiah = 0.00894 yen Average of the International Financial Statistics (IFS) of the IMF (Average value during the project implementation period)
4. Final Disbursement	July 2016	