

**Ex-Post Project Evaluation 2021
Package III-5 (Iraq)
Evaluation Reports**

January 2023

JAPAN INTERNATIONAL COOPERATION AGENCY

**I2I COMMUNICATION, LTD.
METRICS WORK CONSULTANTS INC.**

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Republic of Iraq

FY2021 Ex-Post Evaluation Report of Japanese ODA Loan

“Electricity Sector Reconstruction Project in Kurdistan Region”

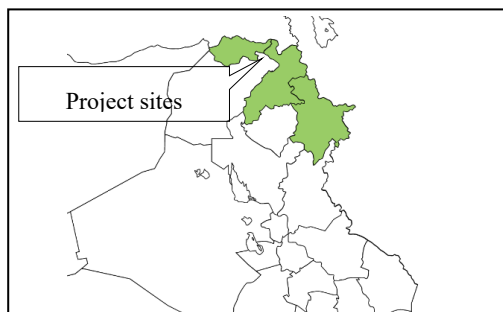
External Evaluator: Ishimoto, Juri/Nishino, Hiroshi/Nomoto, Ayako,

Metrics Work Consultants Inc.

0. Summary

This project was implemented in the Kurdistan Region (Duhok, Erbil, and Sulaymaniyah governorates) to stabilize the electricity supply by providing equipment and materials for substations and distribution, thereby contributing to the economic and social reconstruction of the region. The project is consistent with the development plan and needs of Iraq and the Kurdistan Region at both the time of appraisal and ex-post evaluation, and its relevance can be confirmed. The project is consistent with Japan’s ODA policy for Iraq and with other cooperation of the Japan International Cooperation Agency (JICA). Therefore, the relevance and coherence are high. Additional components were implemented by utilizing the unused balance of the loan, and the outputs were produced, aligning with the revised plan after adding the components. Although the project period slightly exceeded the plan, the project cost was within the plan, and therefore, the efficiency of the project is high. Regarding the effectiveness of the project, an increase in the population with access to electricity was observed. Besides, the stability of the electricity supply, such as improvement of power outages, was improved. In addition, the project strengthened the operation and maintenance capabilities of the technical staff. As for the impacts, the project has contributed to the stabilization of the lives of citizens. Also, it encouraged the revitalization of the economy and industry to a certain extent. Therefore, the effectiveness and impacts are high. Although there are some minor problems in operation and maintenance of the project in terms of institution/organization, finance, and current status of operation and maintenance, the prospects for improvement and resolution are high. Therefore, the sustainability of the project’s effects is high. In light of the above, this project is evaluated to be very high.

1. Project Description



Project Location¹



Chwarta Substation constructed under the project²

¹ Source: 3kaku-K

² Taken during the ex-post evaluation study.

1.1 Background

After years of economic sanctions and conflict that had dealt a severe blow to its economy and society, Iraq had been recovering with the support of the international community since the end of the war. Although the electric power sector is the foundation of all economic and social activities, the lack of new investment and maintenance over the years, as well as looting, had significantly reduced the functionality of all areas of power generation, transmission, substation, and distribution. Its restoration was one of the most critical issues for the country's reconstruction.

Electricity in the Kurdistan Region (population 4.4 million), which consists of three northern Iraqi governorates (Duhok, Erbil, and Sulaymaniyah), was supplied by two hydroelectric power plants and the national grid and was provided through 132 kV, 33 kV, and 11 kV power transmission and distribution networks. However, due to a lack of new investment and maintenance due to chronic budget shortfalls, the electricity supply in the region had decreased from an average of 700 MW in 1991 to 400 MW in 2006, only meeting 40% of household electricity demand. In addition, the average daily power outage was more than 12 hours, and the supply of electricity to citizen's daily lives and essential infrastructures, such as hospitals, continued to be inadequate and unstable. Although other development partners planned to support power generation and transmission facilities in the Kurdistan Region, support for substation and distribution facilities had been delayed. As a result, the significant deterioration of substation and distribution functions became one of the reasons for the deteriorating power supply situation in the region. Therefore, it was necessary to urgently repair and maintain the substation and distribution facilities in addition to the power generation and transmission facilities.

1.2 Project Outline

The objective of this project is to stabilize the electricity supply in the Kurdistan Region (Duhok, Erbil, and Sulaymaniyah governorates) by providing equipment and materials for substations and distribution, thereby contributing to the economic and social reconstruction of the Kurdistan Region.

Loan Approved Amount/ Disbursed Amount	14,747 million yen/ 11,773 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	July 2007/ June 2008
Terms and Conditions	Interest Rate 0.75% (0.01% for the consulting services)
	Repayment Period 40 years (Grace Period 10 years)

	Conditions for Procurement	General Untied
Borrower / Executing Agency(ies)	Government of the Republic of Iraq/Regional Ministry of Electricity in Kurdistan (hereinafter referred to as “RMEK”)	
Project Completion	August 2018	
Target Area	Kurdistan Region (Duhok, Erbil, and Sulaymaniyah governorates)	
Main Contractor(s) (Over 1 billion yen)	Consortium Luthardt Roland Berger Restrata (Germany), Matelec S.A.L (Lebanon)	
Main Consultant(s) (Over 100 million yen)	United Nations Development Programme (UNDP) (Other)	
Related Studies (Feasibility Studies, etc.)	None	
Related Projects	<Japanese ODA Loan> “Water Supply Improvement Project in Kurdistan Region” (2009-2014)	

2. Outline of the Evaluation Study

2.1 External Evaluator³

Ishimoto, Juri/Nishino, Hiroshi/Nomoto, Ayako⁴ (Metrics Work Consultants Inc.)

2.2 Duration of Evaluation Study

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

Duration of the Study: January 2022 - January 2023

Duration of the Field Study (Third Country)⁵: September 25 - September 29, 2022

2.3 Constraints during the Evaluation Study

For security reasons, a local consultant conducted a field study for this ex-post evaluation. Under the direction of the external evaluator, the local consultant collected necessary information through interviews with the executing agency and field visits. The information obtained from the field study was analyzed and evaluated after confirming and scrutinizing the information with the

³ Ishimoto and Nishino were in charge of the work up to the formulation of the evaluation framework and satellite data analysis, while Nomoto took the lead in data collection and analysis (excluding satellite data analysis) and report writing after the formulation of the evaluation framework.

⁴ Participated as a reinforcement member from the International Development Center of Japan Inc.

⁵ Field study refers to discussions with a local consultant in a third country (Jordan).

local consultant in a third country (Jordan).

3. Results of the Evaluation (Overall Rating: A⁶)

3.1 Relevance/Coherence (Rating: ③⁷)

3.1.1 Relevance (Rating: ③)

3.1.1.1 Consistency with the Development Plan of the Republic of Iraq

The project is consistent with the development plan of the Government of Iraq and the Kurdistan Region, as an investment in power transmission and distribution facilities was emphasized both at the time of appraisal and ex-post evaluation.

At the time of the appraisal, the *National Development Strategy (2005-2007)* stated that investment from both the public and private sectors was needed to restore the devastated postwar economy. The strategy aimed to provide an environment to stimulate private investment through investment in infrastructures such as water, electricity, and roads, as well as to create jobs and improve people's lives through private investment. Investment in electric power facilities was positioned to promote private investment. The medium-term goal was to build a reliable and efficient power supply system. Priorities were set on improving power generation capacity, upgrading the power distribution network, and increasing transmission and substation capacity to secure generating capacity.

At the time of the ex-post evaluation, the *National Development Plan (2018-2022)* aims to achieve an economic growth rate comparable to that achieved by the Iraqi economy in the past. To achieve this goal, the plan calls for increasing infrastructure efficiency, including electricity, through improved asset management and other measures and promoting the productive sectors (industry and agriculture), which are vital to fostering economic growth. The plan's challenges in the power distribution sector include high loads caused by increased demand and aging facilities. To address these issues, the plan sets goals to expand and upgrade the power transmission and distribution network and reduce power losses. In the *Iraq Electricity Masterplan (2010-2030)*, which outlines specific development plans, it is stated that it is necessary to supply fuel to power plants, connect to the power grid, and develop the power grid in parallel to meet Iraq's electricity demand.

The Kurdistan Regional Government, with the support of the United States, is currently developing the master plan for electricity transmission and distribution in the Kurdistan Region (2022-2031), which aims to (1) install 400/132 kV, 132/33/11 kV, and 33/11 kV substations, (2) strengthen the transmission network by connecting new substations, (3) extend the distribution network to new districts, commercial and industrial buildings, and to supply electricity to some villages and rural areas.

⁶ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

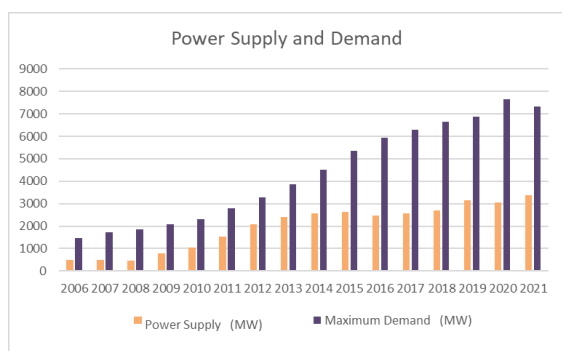
⁷ ④: Very High, ③: High, ②: Moderately Low, ①: Low

3.1.1.2 Consistency with the Development Needs of the Republic of Iraq

Development needs for electricity supply stabilization in the Kurdistan Region are high, both at the time of the appraisal and at the time of the ex-post evaluation.

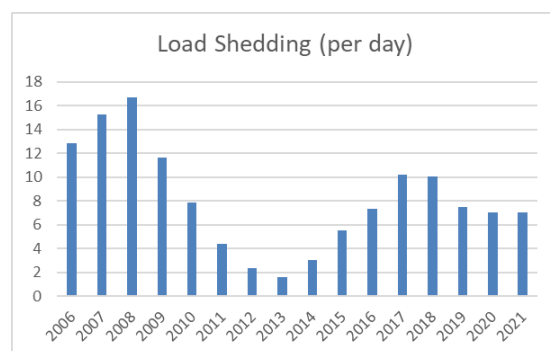
At the time of the appraisal in the Kurdistan Region, the electricity supply in the region (approximately 400 MW) only met 40% of household electricity demand as of 2006. As of 2007, the electricity supply averaged 10-11 hours per day in the Duhok Governorate and 5-6 hours per day in the Erbil and Sulaymaniyah governorates. Support for substation and distribution facilities in the Kurdistan Region had been delayed, and the significant deterioration of substation and distribution functions had aggravated the electricity supply situation in the region. Repair and maintenance of substation and distribution facilities were needed accordingly.

At the time of the ex-post evaluation, supply still needed to keep up with strong electricity demand, as shown in Figure 1. Therefore, although there has been some improvement, load shedding has continued (Figure 2). This is primarily due to a lack of generation capacity, but also due to a lack of transmission and distribution network capacity. Thus, a stable electricity supply is still needed.



Source: Documents provided by the executing agency

Figure 1: Electricity Supply and Demand

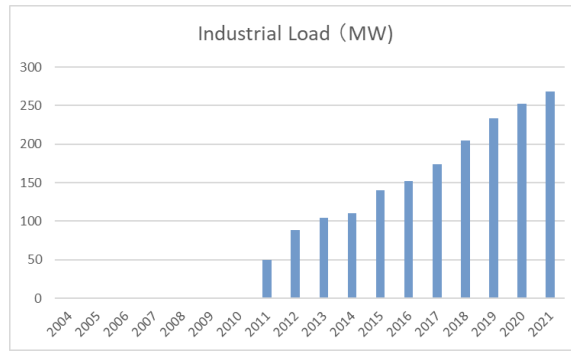


Source: Documents provided by the executing agency

Figure 2: Load Shedding

The increase in demand at the time of ex-post evaluation was due to the rise in the population of the Kurdistan Region (the estimated population in 2020 is 6,171,083 people⁸), the development of new villages, buildings, and factories (see Figure 3: Electricity Supply to Industrial Subscribers), as well as the influx of Syrians from the humanitarian crisis in Syria (2012), and Iraqi Internally Displaced Persons (“IDPs”) in 2014 due to attacks on the governorates of Ninewa and Anbar by ISIS. The increase in the number of IDPs and refugees led to the construction of dozens of IDP and refugee camps, all supplied with electricity, resulting in a rapid increase in electricity demand.

⁸ Source: <https://krso.gov.krd/en/statistics/population> (accessed August 21, 2022)



Source: Documents provided by the executing agency
 Note: No data before 2010.

Figure 3: Electricity Supply to Industrial Subscribers

At the time of the ex-post evaluation, as indicated by the growth in electricity supply to industrial subscribers in Figure 3, the project has addressed the needs for development. At the same time, the project has contributed electricity supply to the growing number of refugee and IDP camps, thus benefiting those who are prevented from equitable participation in society.

3.1.2 Coherence (Rating: ③)

3.1.2.1 Consistency with Japan’s ODA Policy

At the time of the appraisal, this project was consistent with Japan’s ODA policy. In October 2003, at the International Donor’s Conference on the Reconstruction of Iraq held in Madrid, the Government of Japan announced that, in addition to US\$1.5 billion in grant assistance for Iraq’s immediate reconstruction needs, it would provide US\$3.5 billion in ODA loan for medium-term reconstruction needs beginning in 2005. In addition, the *Medium-Term Strategy for Overseas Economic Cooperation Operations* (April 2005) of JICA (then JBIC) also included economic and social infrastructure development for poverty reduction and sustainable growth as priority areas in its policy for assistance to the Middle East, depending on each country’s circumstances. In particular, for Iraq, it was indicated that mid- to long-term reconstruction assistance would be actively promoted toward social stability and the consolidation of peace.

3.1.2.2 Internal Coherence

As an additional component during the project implementation, a dedicated 33 kV transmission line (about 15 km) and an 11 kV distribution line were constructed in Halabja, Sulaymaniyah Governorate. They supply electricity to the water supply facilities (intake, treatment facilities, and distribution facilities) built under the ODA loan “Water Supply Improvement Project in Kurdistan Region” (2009-2014) (see “3.2.1 Project Outputs”). As a result, 93,000 people gained new access to the water supply as described in “3.3.1.1 Quantitative Effects (Operation and Effect Indicators),”

and thus, there is an internal coherence.

3.1.2.3 External Coherence

There are no specific collaborations or outcomes planned or implemented.

Thus, the project is consistent with the development plan of Iraq and the Kurdistan Region and with the development needs (stable electricity supply). There is no external coherence in specific cooperation or outcomes. Meanwhile, it is consistent with Japan’s ODA policy, and internal coherence was found as the access to the water supply of the people improved since the project supplied electricity to the facilities under the “Water Supply Improvement Project in Kurdistan Region” facilities. Therefore, its relevance and coherence are high.

3.2 Efficiency (Rating: ③)

3.2.1 Project Outputs

(1) Civil engineering work, equipment procurement

At the time of the appraisal, procurement of testing equipment and materials (subproject 1), procurement and installation of mobile substations (subproject 2), procurement of equipment and materials for power distribution (subproject 3), and construction of a 132/33 kV substation in Erbil Governorate (subproject 4) were planned. The outputs were produced almost as planned.

In addition, the executing agency requested JICA to utilize the unused balance of the ODA loan effectively as mentioned in “3.2.2.1 Project Cost.” JICA agreed to the construction of a 132 kV power transmission line in Sulaymaniyah, Sulaymaniyah Governorate (subproject 5), refurbishment and procurement of equipment of the Central Training Center, construction of a testing facility in each governorate, and implementation of training (subproject 6), construction of a 33 kV overhead power transmission line in Halabja and others (subproject 7), and procurement of mini SCADA (Supervisory Control and Data Acquisition) system and VoIP (Voice over Internet Protocol) communication system for the control center (subproject 8). The outputs were produced as this revised plan.

Table 1 Project Outputs (civil engineering works and procured equipment)

Subproject	Plan at the time of appraisal *1	Revised plan	Actual
1	• Procurement of testing equipment	• No change	• Procurement of fault locators, high voltage testers, testing equipment, and digital measuring instruments
2	• Procurement and installation of mobile substations	• No change	• Procurement and installation of 13 mobile substations of 132/33 kV, 132/11.5kV, and 33/11.5kV

3	<ul style="list-style-type: none"> Procurement of materials and equipment for power distribution 	<ul style="list-style-type: none"> No change 	<ul style="list-style-type: none"> Procurement of 250 kVA, 400 kVA, 630 kVA transformers, 630 kVA, and 1,000 kVA kiosk-type substations, etc.
4	<ul style="list-style-type: none"> Construction of 132/33 kV substation (rehabilitation of Azadi substation) (Erbil Governorate)*2 	<ul style="list-style-type: none"> No change 	<ul style="list-style-type: none"> Construction of a 132/33 kV substation in Chwarta (Sulaymaniyah, Sulaymaniyah Governorate)
5	<ul style="list-style-type: none"> No initial plan 	<ul style="list-style-type: none"> Construction of 132 kV transmission line Construction of a warehouse for maintenance (in Sulaymaniyah, Sulaymaniyah Governorate) 	<ul style="list-style-type: none"> Construction of a 132 kV transmission line (25.3 km) from the Chwarta substation to Sulaymaniyah Construction of a spare parts storage warehouse
6-1		<ul style="list-style-type: none"> Construction of testing facilities Guest House in Erbil Governorate 	<ul style="list-style-type: none"> Construction of testing facilities Construction of a guesthouse at the Central Training Center in Erbil
6-2-1		<ul style="list-style-type: none"> Refurbishment of Central Training Center (Erbil, Erbil Governorate) 	<ul style="list-style-type: none"> Refurbishment of the Central Training Center
6-2-2		<ul style="list-style-type: none"> Procurement of equipment for Central Training Center in Erbil Provide training to RMEK (Erbil, Erbil Governorate) 	<ul style="list-style-type: none"> Procurement of testing equipment, office furniture, and facilities Training implementation
6-3		<ul style="list-style-type: none"> Procurement of services for the operation, maintenance guidance of the Central Training Center (Erbil, Erbil Governorate) 	<ul style="list-style-type: none"> Operation and maintenance of facilities, training operational guidance
7		<ul style="list-style-type: none"> Construction of overhead transmission lines (Halabja, Sulaymaniyah Governorate) 	<ul style="list-style-type: none"> Construction of a 33 kV transmission line (approx. 15km) and an 11kV distribution line in Halabja to supply electricity to the "Water Supply Improvement Project in Kurdistan Region."
8		<ul style="list-style-type: none"> Procurement of mini SCADA and VoIP communication system for the Kurdistan Regional Control Center, Erbil, Erbil Governorate 	<ul style="list-style-type: none"> Procurement of mini SCADA and VoIP communication systems for 51 power plants, substations, and control centers

Source: Documents provided by JICA and executing agency

Note: *1 For those without a target area listed, installed in Duhok, Erbil, and Sulaymaniyah governorates.

*2: At the time of the appraisal, it was assumed that the existing substation would be rehabilitated. After the project started, an Implementation plan (IP) describing the planned substation construction site, necessity, scope, etc., was to be prepared by the executing agency and finalized after obtaining the consent of JICA (then JBIC). Subsequently, in June 2009, RMEK submitted an IP for constructing the Chwarta Substation near Sulaymaniyah, Sulaymaniyah Governorate, and JICA gave its consent.

The background and reasons for the additional subprojects are described below, all recognized as necessary and appropriate.

<Subproject 5>

The project was originally planned to be self-financed by the executing agency and had already been applied for. However, the new Kurdistan Parliament, which came into being after the July 2009 Kurdistan regional parliamentary elections, drastically revised the budget plans of all ministries and agencies, making it difficult to secure a budget for the year. The transmission line was to connect the Chwarta Substation (subproject 4) to the customers and was considered necessary for the sustained development effects.

<Subproject 6>

The executing agency did not have a systematic training program for operation and maintenance and had inadequate training facilities and equipment to provide adequate training to its staff. Since this additional subproject would improve the situation of the substation and distribution of electricity and contribute to the project objective (stable supply of electricity), its implementation was approved.

<Subproject 7>

The Sulaymaniyah Governorate Government had initially planned to finance the construction of a power transmission line for the construction of a water treatment plant (in Halabja) and the replacement of water pipes (in Sulaymaniyah) under the “Water Supply Improvement Project in Kurdistan Region,” the ODA loan project. Still, the construction became impossible due to budget shortfall. The executing agency of the water project (Ministry of Municipalities and Tourism) requested RMEK, the executing agency of this project, to implement this subproject. It was recognized that the stable supply of electricity through the construction of this transmission and distribution lines was indispensable for the water project to be effective.

<Subproject 8>

A SCADA system for remote monitoring and manipulation of substation data in the Kurdistan Region was required to maintain a balance between supply and demand. However, the implementation of the system was suspended due to a lack of funding. The scope of the proposed

subproject was included in the transmission system, which was the project's main scope. The electricity supply in the Kurdistan Region was unstable and subject to frequent voltage fluctuations, necessitating a reliable and more efficient control system such as SCADA.

(2) Consulting services

Consulting services were implemented as planned.

Table 2 Project Outputs (Consulting Services)

Plan	Actual
• Procurement support (preparation of pre-qualification documents and bidding documents, bid preparation, implementation and evaluation, and contract assistance)	As planned.
• Construction supervision	As planned.

Source: Documents provided by JICA and the executing agency

3.2.2 Project Inputs

3.2.2.1 Project Cost

Table 3 shows the planned and actual project costs. Despite the additional components, the project cost was within the plan at 11,923 million yen actual versus the planned 19,861 million yen (60% of the planned). The lower-than-planned cost was mainly because the contractor/supplier bidding prices were estimated higher, considering the security risks in Iraq; however, the security situation improved during the implementation period, allowing the project to attract more bidders and to make the bidding more competitive. Also, the price escalation and physical contingency became zero.

Table 3 Project Costs

Item	Plan			Actual		
	Foreign currency (Million yen)	Local currency (Million yen)	Total (Million yen)	Foreign currency (Million yen)	Local currency (Million yen)	Total (Million yen)
Equipment Procurement	8,314	1,586	9,900	9,858	0	9,858
Price Escalation	593	658	1,251	0	0	0
Physical Contingency	1,781	448	2,229	0	0	0
Consulting Services	856	174	1,030	1,765	0	1,765
Administration Cost	0	2,436	2,436	0	150	150
Compensation for Temporary Land Use	0	1,876	1,876	0	0	0
Tax	0	802	802	0	0	0
Interest during Construction	337	0	337	150	0	150
Total	11,881	7,980	19,861	11,773	150	11,923

Source: Data provided by JICA for the time of the appraisal and the actual cost of the foreign currency portion; data for the actual local currency portion provided by the executing agency.

Note: Iraqi responsibility: Administration cost, compensation for temporary land use, and taxes = 5,115 million yen

(planned), 150 million yen (actual)

Actual local currency values are converted at the IFS rate (expenditures for each year are converted at the respective 2009-2018 annual average rates).

3.2.2.2 Project Period

The actual project period was 121 months compared to the plan of 116 months after the change (after adding subprojects), slightly exceeding the plan (104% of the plan). The table below shows the planned and actual project period for each item, and it can be said that the project was implemented almost as planned.

Table 4 Project Period

Item	Plan (at the time of appraisal)	Revised plan	Actual
Consultant Selection	September 2008 - August 2009 (12 months)	No change	August 2008 - January 2009 (6 months)
Consulting Services	September 2009 - January 2014 (53 months)	January 2009 - March 2016 (87 months)	January 2009 - August 2018 (116 months)
Subproject 1 (Testing materials and equipment)	November 2009 - August 2011 (22 months)	No change	May 2010 - June 2011 (14 months)
Subproject 2 (Mobile substations)	November 2009 - January 2013 (39 months)	No change	March 2010 - April 2011 (14 months)
Subproject 3 (Materials and equipment for power distribution)	November 2009 - December 2012 (38 months)	No change	September 2010 - October 2010 (14 months)
Subproject 4 (Chwarta 132/33 kV substation)	November 2009 - January 2013 (39 months)	September 2011 - July 2013 (23 months)	April 2012 - April 2014 (25 months)
Subproject 5 (132kV transmission line)	No initial plan	September 2012 - June 2014 (22 months)	November 2012 - August 2014 (22 months)
Subproject 6 (testing facilities, training facility, equipment, training, etc.)		May 2013 - December 2016 (44 months)	February 2016 - July 2018 (30 months)
Subproject 7 (Halabja 33kV overhead transmission lines, etc.)		November 2014 - January 2016 (15 months)	July 2015 - March 2016 (9 months)
Subproject 8 (Mini SCADA systems, etc.)		November 2016 - April 2018 (18 months)	December 2017 - August 2018 (9 months)
Total amount	September 2008 - January 2014 (65 months)	September 2008 - April 2018 (116 months) *1	August 2008 - August 2018 (121 months)

Source: Documents provided by JICA and the executing agency

Note: *1 "Scheduled project start date before the addition of the components to the latest scheduled completion date of the additional component" is defined as the modified planning period.

From the above, outputs were produced as planned, and although the project period exceeded the plan, the project cost was within the plan. Therefore, the efficiency is high.



250 kVA transformer



Mobile substation



132 kV transmission line
from Chwarta Substation

3.3 Effectiveness and Impacts⁹ (Rating: ③)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

At the time of the appraisal, the operation and effect indicators of the project and their target values were not set, and the baseline survey for the target area was to be conducted after signing the loan agreement to establish the baseline and target values for the operation and effect indicators. However, at the time of the ex-post evaluation, the implementation status and results of the baseline survey could not be confirmed.

In the report submitted by RMEK at the time of project completion, “Population newly connected to electricity”, “Population with improved quality of electricity,” and “Population benefitted from receiving water under the water supply project (Water Supply Improvement Project in Kurdistan Region) by supplying the electricity” were submitted as indicators of the project’s effectiveness, along with actual values. However, the executing agency did not collect data after the project completion partly due to COVID-19; thus, data was unavailable at the time of the ex-post evaluation.

⁹ When providing the sub-rating, Effectiveness and Impacts are to be considered together.

Table 5 Indicators set upon completion of the project

Indicator	Subproject	Baseline value	Actual value		
		2007	2018 Year of Project Completion	2019 1 Year After Completion	2020 2 Years After Completion
Population newly connected to electricity	2	0	31,909	-	-
	3	0	77,522	-	-
	4 and 5	0	19,333	-	-
	Total	0	128,764	-	-
Population with improved quality of electricity	2	0	287,182	-	-
	3	0	1,400,187	-	-
	4 and 5	0	42,889 *1	-	-
	Total	0	1,730,258		
Population benefitted from receiving water under the water supply project by supplying the electricity	7	NA	1,287,600 *2	-	-

Source: Documents provided by the executing agency

Note: *1 According to the interviews conducted during the field visit under the ex-post evaluation (Directorate of Transmission, RMEK Sulaymaniyah General Directorate), the current electrified population due to subprojects 4 and 5 is 18,300 people.

*2 According to interviews during the field visit at the time of the ex-post evaluation (by a manager of the water directorate in Halabja Governorate), the population who has access to water as a result of the project was 93,000, and water was also supplied to the Halabja Governorate Government Office and national parks.

Alternatively, Table 6 shows the number of domestic households among the total RMEK subscribers since 2016. Where the average household size in the Kurdistan Region is 5.1 persons¹⁰, the population with access to electricity is estimated to be the figures in Table 6. As described in “3.1.1.2 Consistency with the Development Needs of the Republic of Iraq,” the estimated population of the Kurdistan Region is 6,171,083 people in 2020, so the electrification rate is estimated to be almost 100%, and the newly connected population from the project will also contribute. Although data were unavailable, according to RMEK, the distribution equipment (subproject 3) and mobile substations (subproject 2) are providing sustainable electricity to newly developed residential and remote areas that previously had no access to electricity.

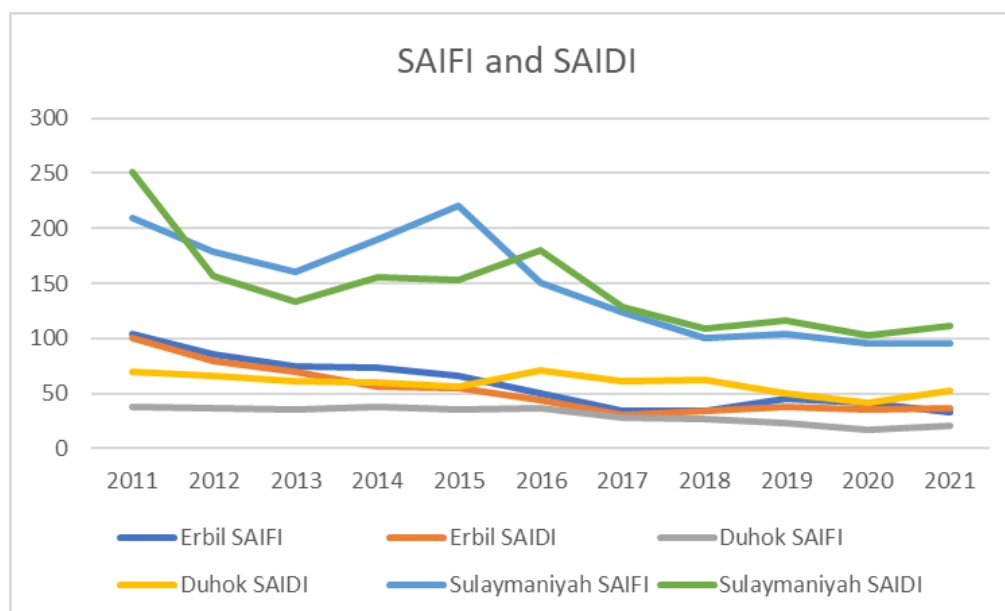
¹⁰ Source: “Demographic survey July 2018”, IMO

Table 6 Estimated Electrified Population

	2016	2017	2018	2019	2020	2021
Domestic Subscribers	430,177	1,256,789	1,295,207	1,356,614	1,414,953	1,472,922
Estimated Electrified Population	2,193,903	6,409,624	6,605,556	6,918,731	7,216,260	7,511,902

Source: Documents provided by the executing agency, <https://krso.gov.krd/en/statistics/population> (accessed August 21, 2022).

In addition, the System Average Interruption Frequency Index (SAIFI) and the System Average Interruption Duration Index (SAIDI) were collected to verify the relationship between the project and the outcome (stabilization of electricity supply). Figure 4 shows SAIFI and SAIDI¹¹. Since 2011, when subprojects 1, 2, and 3 were completed, SAIFI and SAIDI have been improving.



Source: Documents provided by the executing agency

Figure 4: SAIFI and SAIDI for each governorate

As noted in “3.1.1.2 Consistency with the Development Needs of the Republic of Iraq,” there has been a slight increase in load shedding hours due to recent supply and demand conditions (see Figure 1); nonetheless, there has been improvement since 2011 (see Figure 2).

These improvements are brought about partly by the expansion of distribution capacity and elimination of overloads on existing transformer equipment through procurement of mobile

¹¹ SAIFI is the number of power outages per customer per year, expressed in units of the number of outages/household, and SAIDI is the hours of power outages per customer per year, expressed in units of hours/household. The lower the value of both, the better.

substations (subproject 2) and procurement of various distribution equipment such as 250 kVA, 400 kVA, and 630 kVA transformers, 630 kVA and 1,000 kVA kiosk-type substations (subproject 3). In addition, the procurement of testing equipment and materials (subproject 1) and the enhancement of operation and maintenance management techniques through developing training facilities (subproject 6) have contributed to the above improvements.

3.3.1.2 Qualitative Effects (Other Effects)

(1) Strengthening of implementation, operation, and maintenance system of the Regional Ministry of Electricity in Kurdistan

According to RMEK, the project's measurement and testing equipment (subproject 1) has enabled each governorate's technical staff (young technicians, engineers, directors, etc.) to effectively and efficiently perform the routine operation and maintenance tasks in the distribution, substation, and transmission facilities.

In addition, due to the refurbishment of the Central Training Center and the construction of the testing facility in each governorate (subproject 6) under the project, training has continued to be provided, as shown in Table 7. According to the executing agency, the number of training courses has increased, and more advanced training can be conducted than before the project implementation. The staff's operational and maintenance skills have improved through theoretical and practical training. The Central Training Center has appointed a manager and a training manager and conducts training regularly.

Table 7 Number of training courses and participants at each facility

	2019		2020		2021	
	Number of training courses	Number of Participants	Number of training courses	Number of Participants	Number of training courses	Number of Participants
Central Training Center	54	217	41	235	52	246
Erbil Testing Facility	-	-	-	-	11	356
Sulaymaniyah Testing Facility	-	-	-	-	12	164
Duhok Testing Facility	12	150	2	24	12	96

Source: Documents provided by the executing agency

Note: In the ex-post evaluation year (2022), no training was conducted in Sulaymaniyah and Duhok due to budget constraints. Information on the number of training courses and participants for 2019 and 2020 was not available; however in 2019, Erbil offered a variety of training courses, including maintenance and testing of distribution and substation facilities according to international standards, SCADA system, maintenance and testing of 33-11 KV substations, distribution grid design for underground cables and overhead lines, transmission system protection, and others. In 2020, training on high-voltage overhead transmission was provided. Sulaymaniyah provided training on electrical network in 2019.

3.3.2 Impacts

3.3.2.1 Intended Impacts

Among the effects assumed in the ex-ante evaluation sheet, the ex-post evaluation has classified “stabilization of citizens’ lives” and “revitalization of economy and industry” as impacts.

(1) Stabilization of citizen’s lives

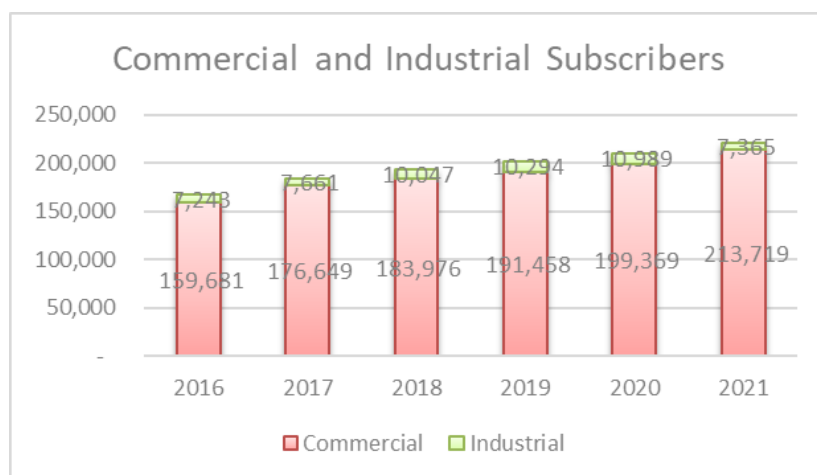
As noted above (“3.3.1.1 Quantitative Effects (Operation and Effect Indicators)”), load shedding remains in place despite improvements. However, large hospitals and water supply facilities are exempted from load shedding as much as possible. In addition, one of the feeders of the mobile substations procured under the project supplies electricity directly to a hospital. In addition, the project’s construction of transmission and distribution lines in Halabja (subproject 7) has provided power to water supply facilities and improved access to the water supply.

Thus, the stabilization of the electricity supply through this project has made a certain contribution to the stabilization of the lives of citizens.

(2) Economic and industrial revitalization

Gross regional product and other data for the Kurdistan Region were not calculated, so data showing specific economic and industrial revitalization were unavailable. Alternatively, changes in electricity supply to the industrial subscribers and nighttime light are analyzed.

As shown in Figure 3 (“3.1.1.2 Consistency with the Development Needs of the Republic of Iraq”), electricity supply to the industrial subscribers has consistently increased. In addition, as shown in Figure 5, the number of electricity subscribers in the commercial and industrial subscribers has demonstrated consistent growth, indicating that the project is also making a certain contribution.



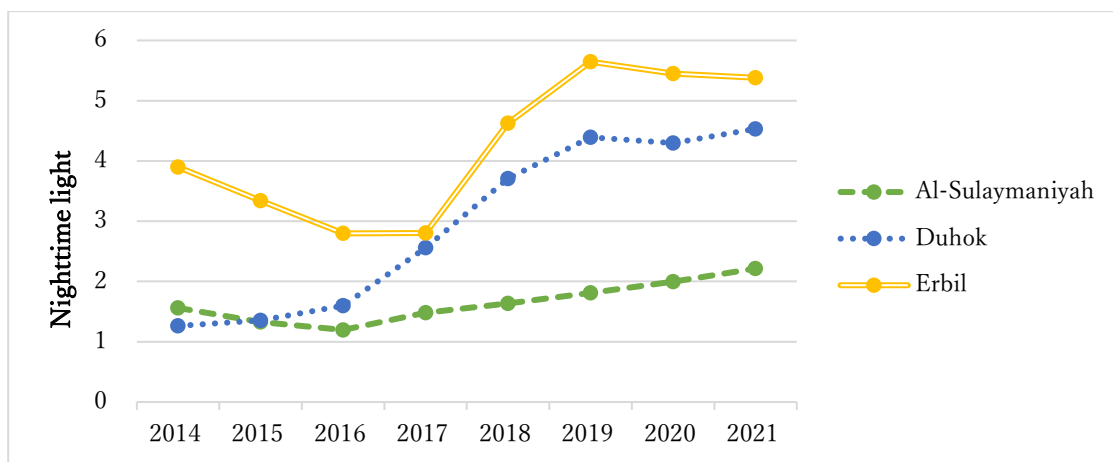
Source: Documents provided by the executing agency

Note: Major commercial subscribers were counted as the industrial subscribers until 2020, but were classified in the commercial subscribers after 2021.

Figure 5: Number of Commercial and Industrial Subscribers

In addition, this ex-post evaluation analyzed nighttime light¹² in the three target governorates as complementary information. Nighttime light has been confirmed to be correlated with local economic activity and can serve as a proxy indicator to measure regional economic and industrial revitalization. Specifically, the analysis examined the realization of economic and industrial revitalization by aggregating the annual average of nighttime light brightness for each of the three governorates and identifying trends from 2014 to 2021.

Figure 6 shows the trend of nighttime light in the three target governorates. In all three governorates, nighttime light has increased since 2016 (when all transmission and substation facilities were installed). In particular, nighttime light has increased significantly in Erbil and Duhok.



Note: The vertical axis of the graph shows the brightness of the light source (radiance), taking the minimum value of -1.5 and the maximum value of 193,564 (units are “nanoWatts/cm²/sr”).

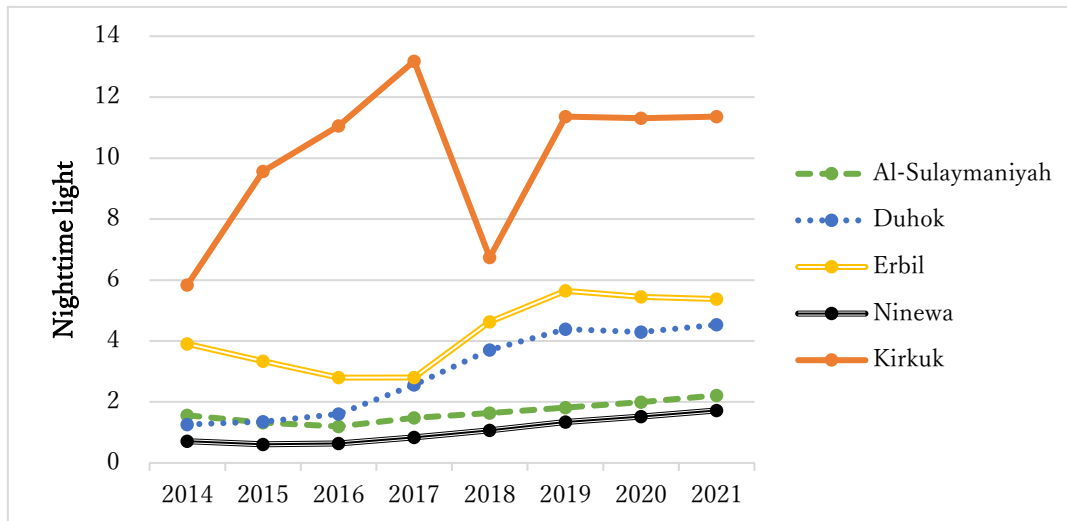
Figure 6: Nighttime light in the three target governorates

To verify the project’s direct impact on economic and industrial revitalization, the changes in nighttime light in the three target governorates are compared with those not covered by the project (comparison group.¹³) (Figure 7). Kirkuk Governorate has seen a significant decrease from 2017 to 2018¹⁴; however, overall nighttime light has increased significantly compared to 2014. Ninewa Governorate has seen a similar, albeit gradual, increase in nighttime light as the three target governorates.

¹² VIIRS Stray Light Corrected Nighttime Day/Night Band Composites Version 1 (2014-2021) (resolution: approximately 500 m).

¹³ The comparison groups were Kirkuk and Ninewa governorates. They are relatively similar to the three target governorates regarding geographic and social conditions (elevation, temperature, annual precipitation, land use, and population).

¹⁴ Nighttime light in Kirkuk and Erbil is decreasing. The evaluation team tried to find the factors through the local consultant but could not determine the contributing factors.



Note: The vertical axis of the graph shows the brightness of the light source (radiance), taking the minimum value of -1.5 and the maximum value of 193,564 (units are “nanoWatts/cm²/sr”).

Figure 7 Comparison of nighttime light with the comparison group

Based on the above results, the possibility that factors other than the project may have affected economic and industrial revitalization cannot be excluded since nighttime light has been increasing in the comparison group that was not subject to the project. This analysis could not clearly demonstrate the causal relationship between the project and economic and industrial revitalization. However, the fact that nighttime light is on an increase trend since 2016 suggests that the project has contributed, at least indirectly to the economic and industrial resurgence in the three target governorates.

3.3.2.2 Other Positive and Negative Impacts

(1) Impacts on the Natural Environment

The project was judged not to fall into any of the sensitive sectors/characteristics and sensitive areas listed in the “JBIC Guidelines for Confirmation of Environmental and Social Considerations” (established in April 2002), and the undesirable effects on the environment were judged not to be significant (Category B). The Environmental Impact Assessment Report for the project was not required to be prepared under Iraqi law, and RMEK was to conduct the monitoring based on the environmental monitoring plan, etc., to be prepared with the consultant’s assistance.

For subprojects 4, 5, 6, and 7 that involve construction, measures were taken to minimize adverse environmental impacts during planning and project implementation. For example, routes were established to reduce tree cutting, and retaining walls were constructed to prevent soil erosion and landslides. During the project implementation, RMEK formed a monitoring team with UNDP, the consultant, to closely monitor the environmental impacts. Appropriate monitoring and response measures were taken regarding noise, vibration, dust, and waste. According to

RMEK, there has been no negative impact on the natural environment.

(2) Resettlement and Land Acquisition

The construction of facilities in this project was mainly carried out on the land of each governorate and within the existing RMEK facilities, and therefore, no land acquisition occurred. For subproject 4, the land belonged to the governorate; however, some farmers were cultivating the land, and negotiations were conducted between RMEK, UNDP, the contractor, the local government, and the farmers. Measures were taken accordingly. For subproject 7, the route was set up in coordination with the Ministry of Agriculture and Water Resources, the governorate, farmers, and others. The governorate formed a committee on compensation and estimated the appropriate amount of compensation to 25 farmers in accordance with Iraqi law for crop damage caused by construction under the project. The Council of Ministers agreed to pay the compensation. It issued a formal letter on June 22, 2022, to the Kurdistan Regional Government's Ministry of Finance and Economy to proceed with the payment.

(3) Gender Equality, Marginalized People, Social Systems and Norms, Human Well-being and Human Rights, and others

The project has contributed to the improvement of the living environment of all residents by electrifying un-electrified areas and supplying electricity to the water supply development project to supply water. In addition, the stable supply of electricity to refugees and IDP camps has brought benefits to these people who have been prevented from equitable participation in society.

Thus, among the expected effects, there was an increase in the number of people who has access to electricity, and the stability of the electricity supply was improved, including improvements in SAIFI and SAIDI and load shedding. Regarding qualitative effects, the operation and maintenance capacity of the technical staff was strengthened. Regarding the expected impacts, the project has contributed to the stabilization of the lives of citizens. It also contributed to the revitalization of the economy and industry to a certain extent. It can also be said that the project has brought positive benefits to those prevented from equitable social participation. The project's negative impacts on social, environmental, and economic aspects are considered negligible.

In light of the above, the implementation of this project has generally produced effects as planned, and the effectiveness and impact of the project are high.

3.4 Sustainability (Rating: ③)

3.4.1 Policy and System

As mentioned in "3.1.1.1 Consistency with the Development Plan of the Republic of Iraq," the

expansion of the power transmission and distribution network is targeted in the Iraqi government's *National Development Plan (2018-2022)* and the master plan for electricity transmission and distribution in the Kurdistan Region (2022-2031), ensuring sustainability from a policy and system perspective.

3.4.2 Institutional/Organizational Aspect

The operation and maintenance of the facilities developed under the project is carried out by each general directorate of Duhok, Erbil, and Sulaymaniyah of the executing agency, RMEK. Under each general directorate are the Directorate of Transmission (operation and maintenance of transmission lines and substations), the Directorate of Electricity Distribution (operation and maintenance of distribution lines, transformers, etc.), and the Directorate of Control and Communications (load management and data collection). Furthermore, under each general directorate, technical staff are assigned to regional offices (Districts, Sub-districts, Transmission Team Centers, and Maintenance Centers), which are responsible for the daily operation and maintenance of distribution lines, transformers, and other equipment locally.

In addition, the training departments of the general directorate implement the training programs. After the project was completed, RMEK established a central committee for training, which prepares and implements an annual capacity-building plan in cooperation with the training departments of each governorate. The main training courses are conducted at the Central Training Center, with supplementary courses conducted at the testing facility in each governorate.

The total number of staff in RMEK as of end of December 2021 was 13,844, which is stable from the 12,161 at the time of the appraisal (2006). The number of staff in each general directorate is shown in the table below, including 1,138 engineers and 5,332 technicians. However, no new staff has been hired since 2014 due to the suspension of budget allocation to the Kurdistan Regional Government due to tensions between the Iraqi government and the Kurdistan Regional Government, as well as the Kurdistan Regional Government's rationalization policy. However, there are no problems with the current number of staff in terms of operation and maintenance. In addition, the Kurdistan Regional Government has established the administrative services committee. It has found a mechanism for inter-ministerial flexibility when there are shortages in ministries, especially in technical staff, and the RMEK's request is given top priority, especially in light of the importance of electricity.

Table 7: Number of Staff of the Executing Agency

General Directorate	Number of staff
Headquarters (Dewan Directorate and General Directorate)	385
Directorate of Regional Control Center	110
Erbil General Directorate	4,142
Sulaymaniyah General Directorate	5,896
Duhok General Directorate	1,806
Garmian General Directorate ¹⁵	713
Halabja General Directorate ¹⁶	792
Total	13,844

Source: Documents provided by the executing agency

Based on the above, it is considered that the operation and maintenance system for substations, transmission lines, and distribution facilities has been established, and the necessary number of staff has been secured. Thus, the sustainability of the institutional/organizational aspect is generally ensured.

3.4.3 Technical Aspect

According to RMEK, the technical staff (engineers and technicians) responsible for operation and maintenance are experienced. They have sufficient skills to perform routine maintenance and emergency repairs of the power grid, with capacity strengthening through on-the-job training (OJT). In addition, as described in Section “3.3.1.2 Qualitative Effects (Other Effects),” training is provided at the Central Training Center and the testing facility in each governorate.

The site visit confirmed that the manuals were adequately stored and referenced.

Thus, the sustainability of the technical aspect of the project is generally ensured.

3.4.4 Financial Aspect

Since 2014, the Iraqi and Kurdistan Regional governments have been facing severe financial difficulties. Besides, due to tensions between them, no budget has been approved for the Kurdistan Regional Government, including RMEK. Therefore, RMEK is attempting to devise ways to raise funds to cover the operation and maintenance costs.

RMEK’s revenues for the past five years are shown in Table 8. 2019 and 2020 saw significant increases in revenues as RMEK installed smart meters and began collecting charges based on electricity consumption data collected from smart meters. 2021 saw continued revenue growth as approximately 80% of customers installed smart meters. The revenue is expected to continue to increase in 2022 and beyond.

¹⁵ It belongs to the Sulaymaniyah Governorate but has an independent general directorate.

¹⁶ Halabja Governorate separated from Sulaymaniyah Governorate in 2021.

Table 8 RMEK Revenue

(Unit: million Iraqi dinars¹⁷)

General Directorate	2018	2019	2020	2021	2022
					(as of August 31)
Erbil	103,765	135,715	130,910	176,432	103,840
Sulaymaniyah	130,927	347,313	235,642	324,397	225,702
Duhok	53,427	76,960	57,221	78,037	42,073
Garmian	3,884	8,934	5,243	7,312	5,008
Halabja	-	-	-	-	3,680
Total	292,003	568,922	429,016	586,178	380,303

Source: Documents provided by the executing agency

In addition, concerning maintenance expenditures, on February 8, 2018, the Ministry of Finance and Economy of the Kurdistan Region issued a letter to RMEK authorizing RMEK to spend 8% of electricity sales revenues on operations and maintenance, which RMEK has allocated to operations and maintenance since 2019. The actual operation and maintenance expenditures since 2019 are shown in the table below.

Table 9: Actual Operation and Maintenance Expenditures

(Unit: million Iraqi dinars)

General Directorate	2019	2020	2021
Erbil	6,606	9,787	10,651
Sulaymaniyah	25,115	6,893	21,178
Duhok	4,539	2,653	3,803
Garmian	0	0	585
Halabja	434	77	453
Total	36,694	19,410	36,670

Source: Documents provided by the executing agency

In addition to the 8%, RMEK makes disbursements for emergency rehabilitation, etc., as needed. For example, in Sulaymaniyah General Directorate, a study was conducted for the maintenance of all substations in Sulaymaniyah Governorate in 2020 (including 69 substations

¹⁷ 1 Iraqi dinar=0.100870 yen (October 2022)

and 130 transformers), and RMEK approved a cost of 38,000,000 Iraqi dinars for maintenance and carried out maintenance accordingly. The overall RMEK expenditure trends are shown in Table 10. The below are recurrent expenditures (salaries, maintenance, and general administrative expenses) and capital expenditures. Some investments are made by private capital, such as independent power producers, and are not included in the spending below.

Table 10: RMEK Expenditure

(Unit: million Iraqi dinars)

	2019	2020	2021
RMEK Expenditure	549,892	369,715	555,258

Source: Documents provided by the executing agency

From the above, although there are some budget allocation problems, it can be said that financial sustainability is generally ensured by efforts to improve revenue and a certain level of operation and maintenance expenditures.

3.4.5 Environmental and Social Aspect

No environmental or social concerns were identified at the time of the ex-post evaluation. Therefore, there are no sustainability risks in this aspect.

3.4.6 Preventative Measures to Risks

No other sustainability risks were found.

3.4.7 Status of Operation and Maintenance

The operating conditions of each facility are generally good, as shown in Table 11.

Table 11: Facilities and Equipment

Subproject	Current Status
1: Testing equipment	Testing equipment is located at each general directorate and further down Districts and Sub-districts. The conditions of the test vans and other testing equipment items were good during the site visits.
2: Mobile substations	All six mobile substations (one each in Duhok and Sulaymaniyah and four in Erbil) identified during the site visit are in good condition. According to RMEK, the other mobile substations are also operating well.

3: Materials and equipment for power distribution (transformers, kiosk substations)	Procured equipment is located at each general directorate and further down the Districts and Sub-districts. The condition of the transformers and kiosk-type substations confirmed during the field visits was good. According to those in charge of substations of the Erbil General Directorate, the transformers procured under the project are of good quality. The failure and burnout rate is about 2% yearly (the failure and burnout rate of Duhok was 13.87% in 2009, before the project. That means the failure and burnout rate of the equipment under the project is lower than that of the transformers before the project). In addition, according to the Sulaymaniyah General Directorate's Directorate of Electricity Distribution, more than 90% of the procured transformers are in operation.
4: Chwarta 132/33 kV substation 5: 132 kV transmission line from the above substation	Both facilities are operating in good condition and have not experienced any failures.
6: Central Training Center and the testing facility in each governorate	The Central Training Center, the testing facility in each governorate, and the testing equipment are in good condition.
7: Halabja 33 kV overhead transmission line, etc.	In good condition. They are operating without hindrance.
8: Mini SCADA, VoIP communication system	None of the mini-SCADAs serviced in Erbil, Duhok, and Sulaymaniyah are operational. A full SCADA is being procured with U.S. assistance. VoIP is not used due to changes in fiber connections.

Sources: Documents provided by the executing agency; interviews with general directorates in Erbil, Duhok, and Sulaymaniyah; site visits to each facility.

The following activities were confirmed from interviews with each general directorate regarding daily maintenance.

<Erbil General Directorate>

Directorate of Transmission (transmission lines and substations): Substations, including mobile substations, are maintained when necessary (about once each season). All substations are managed by a substation supervisor who is responsible for monitoring the substations and reporting any faults.

Directorate of Electricity Distribution (transformers, kiosk-type substations): Oil leaks, etc.,

are visually checked, and inspections are recorded.

<Duhok General Directorate>

Visual checks are performed in the Directorate of Electricity Distribution.

Spare parts are stored at each maintenance center for emergency use, and problems are addressed immediately.

<Sulaymaniyah General Directorate>

The daily inspection of transformers is performed by dispatching an engineer to visually inspect the transformers and submit an inspection and daily report.

The maintenance and engineering staff will make repairs to the extent possible within existing spare parts and the monthly recurring budget and, if necessary, apply to Headquarters for transformer repairs to be budgeted for.

As mentioned above, the current status of operation and maintenance is generally good, and no problems are observed where the inactive mini-SCADA is expected to be renewed.

From the above, although there are some minor problems in operation and maintenance of the project in terms of institutional/organizational and financial aspects as well as the operation and maintenance status, the prospects for improvement and resolution are high, and the sustainability of the project's effects is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project was implemented in the Kurdistan Region (Duhok, Erbil, and Sulaymaniyah governorates) to stabilize the electricity supply by providing equipment and materials for substations and distribution, thereby contributing to the economic and social reconstruction of the region. The project is consistent with the development plan and needs of Iraq and the Kurdistan Region at both the time of appraisal and ex-post evaluation, and its relevance can be confirmed. The project is consistent with Japan's ODA policy for Iraq and with other cooperation of JICA. Therefore, the relevance and coherence are high. Additional components were implemented by utilizing the unused balance of the loan, and the outputs were produced, aligning with the revised plan after adding the components. Although the project period slightly exceeded the plan, the project cost was within the plan, and therefore, the efficiency of the project is high. Regarding the effectiveness of the project, an increase in the population with access to electricity was observed. Besides, the stability of the electricity supply, such as improvement of power outages, was improved. In addition, the project strengthened the operation and maintenance capabilities of the technical staff. As for the impacts, the project has contributed to the stabilization of the lives of citizens. Also, it encouraged the revitalization of the economy and industry to a certain extent.

Therefore, the effectiveness and impacts are high. Although there are some minor problems in operation and maintenance of the project in terms of institution/organization, finance, and current status of operation and maintenance, the prospects for improvement and resolution are high. Therefore, the sustainability of the project's effects is high. In light of the above, this project is evaluated to be very high.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

None.

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

Need to establish appropriate indicators and follow-up

At the time of the appraisal, “a baseline survey for the target area is expected to be conducted after the signing of the loan agreement to set baseline and target values for operation and effective indicators.” However, the baseline survey results could not be confirmed at the time of the ex-post evaluation. The “Population newly connected to electricity,” “Population with improved quality of electricity,” and “Population benefitted from receiving water under the water supply project (Water Supply Improvement Project in Kurdistan Region) by supplying the electricity” , listed as effect indicators in the report submitted by the executing agency at the time of completion, are considered to have been agreed upon by JICA. However, no target values were set, and the definitions were unclear, making it difficult to evaluate the project based on those indicators. In cases where indicators and target values were not set at the time of the appraisal, it is necessary for both the counterpart and JICA to agree on the entity to conduct a baseline survey and the deadline for the survey at the time of the appraisal to ensure that the baseline survey is conducted after the start of the project. Also, JICA needs to confirm the setting of the indicators and target values, and the survey results should be recorded.

5. Non-Score Criteria

5.1. Performance

5.1.1 Objective Perspective

(1) JICA's Contribution

JICA responded to consent requests and inquiries from the executing agency promptly, leading to the smooth implementation of the project.

(2) Cooperation with UNDP

Iraq was unfamiliar with implementing the Japanese ODA loans, and technical assistance on procurement procedures, etc., was essential for smooth implementation. UNDP, having an office in the Kurdistan Region and a long history of supporting the region's electricity sector, was selected as a consultant to facilitate the smooth implementation of this ODA loan project. Based on the track record of extending support to RMEK for a long time, UNDP played an essential role as a consultant in this project throughout the entire project period, including procurement support, implementation support, technical support, financial management, technology transfer (training on power quality, operation, and maintenance), and environmental monitoring, etc. In addition to the enthusiasm and positive attitude of RMEK toward the implementation of the project, the relationship of trust between UNDP and RMEK made it possible for UNDP to provide detailed support for project implementation, leading to the smooth implementation and completion of this project.

End

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
1. Project Outputs	<p><Civil engineering and equipment procurement></p> <ol style="list-style-type: none"> 1) Procurement of testing materials and equipment 2) Procurement and installation of mobile substations 3) Procurement of materials and equipment for power distribution 4) Construction of 132/33 kV substation <p>(Additional components below)</p> <ol style="list-style-type: none"> 5) Construction of 132 kV transmission line and warehouse for maintenance 6) Refurbishment of the Central Training Center, construction of testing facilities, procurement of training equipment, and implementation of training 7) Construction of overhead transmission line (Halabja, Sulaymaniyah Governorate) 8) Procurement of mini SCADA and VoIP communication system <p><Consulting Services></p>	<p><Civil engineering and equipment procurement></p> <ol style="list-style-type: none"> 1) As planned 2) As planned 3) As planned 4) Identified the subject substation (construction of the Chwarta substation in Sulaymaniyah Governorate) 5) As planned 6) As planned 7) As planned 8) As planned <p><Consulting Services> As planned</p>
2. Project Period	<p>(Revised Project Period) September 2008 – April 2018 (116 months)</p>	<p>August 2008 – August 2018 (121 months)</p>
3. Project Cost Amount Paid in Foreign Currency	<p>11,881 million yen</p>	<p>11,773 million yen</p>

Amount Paid in Local Currency	7,980 million yen (92,575 million Iraqi dinars)	150 million yen (1,780 million Iraqi dinars)
Total	19,861 million yen	11,923 million yen
ODA Loan Portion	14,747 million yen	11,773 million yen
Exchange Rate	1 Iraqi dinar = 0.0862 yen (as of February 2007)	Iraqi dinar = 0.0843 yen (Average between 2009 and 2018)
4. Final Disbursement	October 2018	

Republic of Iraq

FY2021 Ex-Post Evaluation of Japanese ODA Loan

“Samawah Bridges and Roads Construction Project”

External Evaluator: Takako Haraguchi, i2i Communication, Ltd.

0. Summary

This project aimed to facilitate north-south traffic in Iraq and alleviate traffic congestion in the city of Samawah by constructing three bridges with a capacity for large vehicle passage and other structures in the city and its surrounding areas within Al Muthanna Governorate in southern Iraq. The project plan was consistent with Iraq’s development policy and development needs and Japan’s ODA policy, and the project generated positive outcomes by deliberately cooperating and coordinating with the humanitarian reconstruction aid by the Japan Ground Self-Defense Force (“JGSDF”). Therefore, the relevance and coherence of the project are high. The objectives of the project were also mostly achieved. As a result of implementing the project, the traffic volumes on the three bridges have exceeded the plan by the time of the ex-post evaluation, eliminating the traffic congestion. Although the intended impact, i.e., contribution to the economic and social reconstruction of Iraq, was not verified quantitatively, it was qualitatively verified that the project successfully responded to an increased level of economic activities in Al Muthanna Governorate and helped improve the convenience of everyday life. Therefore, effectiveness and impacts are high. Efficiency is moderately low because the project period significantly exceeded the plan. Although the project had minor issues with respect to the placement of maintenance/administrative personnel as well as with the budgetary aspect, it is expected that these aspects will improve to allow the continuation of the project effect. Therefore, sustainability is high.

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

1. Project Description



Project Location (source: 3kaku-K)



Samawah North Bridge
(source: Ex-post evaluation team¹)

1.1 Background

Having been severely damaged economically and socially by many years of economic sanctions and wars, Iraq, with assistance from the international community, was promoting its reconstruction efforts in the post-war period. The rehabilitation and expansion of the road network was a top priority because transporting aid goods and equipment via the neighboring countries was essential for the reconstruction and smooth implementation of the reconstruction aid. In particular, the National Highway No. 1 (“NH 1”), linking the Kuwaiti border and the Syrian and Jordan borders through the capital city of Baghdad and serving as a major arterial of the country’s transportation, had, as of 2008, an approximately 140-km section between Nasiriyah and Diwaniya in the south where the restoration had not been completed, forcing vehicles traveling north-south to take a detour to the National Highway No. 8 (“NH 8”). As a result, the city of Samawah, Al Muthanna Governorate, where NH 8 travels right through the city center, was experiencing chronic traffic congestion due to the addition of north-south traveling vehicles to the normal city traffic. In addition, because the city was dissected to the northern and southern parts by the Euphrates, serious traffic congestion was occurring near Samawah Bridge (in the city center), where NH 8 crossed the Euphrates. This was not only making the daily life of the citizens less convenient but also creating a hindrance to the progress of the reconstruction aid. All bridges within the city and in its surrounding areas except for Samawah Bridge were temporary bridges, including narrow floating bridges or submerged bridges. Since large vehicles could not travel these bridges, the situation inevitably turned Samawah Bridge into a single point of congestion for large vehicles.

¹ Photo taken by DIJLAH Company for Engineering Consultancies Ltd. (which supplied field study assistants). The same for other photos of this project.

Al Muthanna Governorate, with the city of Samawah in its center, was experiencing significant deterioration of the basic infrastructure for the residents and was the governorate with the highest unemployment rate in the country. In the city of Samawah and its surrounding areas (“Samawah”), Japan had carried out emergency humanitarian aid through Grant Aid since 2004 and had provided humanitarian reconstruction aid between February 2004 and June 2006 through the JGSDF troops stationed in Iraq (restoration and development of public facilities including city roads, medical aid, and assistance in water supply). The two assistance efforts by Japan in Samawah—the assistance by the JGSDF and the ODA—produced positive outcomes by reinforcing each other, and it was hoped that Japan’s assistance would expand for mid- and long-term development after the withdrawal of the JGSDF.

1.2 Project Outline

This project aims to facilitate north-south traffic in Iraq and alleviate traffic congestion in the city of Samawah by constructing facilities including three bridges with a capacity for large vehicle passage in Samawah, thereby contributing to the economic and social reconstruction of Iraq.

Loan Approved Amount / Disbursed Amount	3,348 million yen / 3,123 million yen
Exchange of Notes Date / Loan Agreement Signing Date	January 2007 / January 2008
Terms and Conditions	Interest Rate 0.75%
	Repayment Period 40 years (Grace period 10 years)
	Conditions for Procurement General Untied
Borrower / Executing Agency	The Government of the Republic of Iraq / The Ministry of Construction, Housing, Municipalities, and Public Works (“Ministry of Construction and Housing” or “MOCH” ²)
Project Completion	May 2018
Target Area	Samawah, Al Muthanna Governorate
Main Contractors (Over 1 billion yen)	DAAR Engineering, Inc. (United States) / Burj Al Emaar Co. (Iraq) (JV)
Main Consultant (Over 100 million yen)	DPI Konsult Sdn Bhd (Malaysia)

² The name at the time of the implementation of this project was the “Ministry of Construction and Housing.” For convenience, it is referred to as the “Ministry of Construction and Housing” or “MOCH” in this report.

Related Studies (Feasibility Studies, etc.)	“Outline Design Study Report on the Road and Bridge Construction Plan in Samawah and Surrounding Areas in Iraq,” Japan International Cooperation Agency (JICA), 2005 (“Outline Design” ³)
Related Projects	<ul style="list-style-type: none"> • Humanitarian reconstruction aid by the JGSDF (2004-2006) • The World Bank, “Emergency Road Rehabilitation Project” (2007-2014) (An International Development Association (IDA) loan)

2. Outline of the Evaluation Study

2.1 External Evaluator

Takako Haraguchi, i2i Communication, Ltd.

2.2 Duration of Evaluation Study

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

Duration of the Study: January 2022 – January 2023

Duration of the Field Study: March 2022 – August 2022 (conducted remotely from Japan and Jordan⁴)

2.3 Constraints during the Evaluation Study

Direct interviews with local residents were not conducted in the field study in consideration of safety; the evaluation was carried out based on the information obtained from government agencies and the data actually measured by our field study assistants.

³ Initially, assistance through Grant Aid was considered for this project. However, it was decided to provide assistance through an ODA Loan due to the delay in finalizing the project scope, the progress that took place in the project formation for the Grant Aid portion, and other factors.

⁴ Since the ex-post evaluator was unable to travel to Iraq to conduct the study due to safety reasons, field study assistants, under the instructions of the ex-post evaluator, conducted interviews with the executing agency and relevant agencies and on-site fieldwork (duration of the on-site fieldwork: May 15-18 and May 30-31, 2022). Some interviews were conducted online by the ex-post evaluator. In addition, the ex-post evaluator and the field study assistants had meetings in March and August 2022 in a third country (Jordan).

3. Results of the Evaluation (Overall Rating: A⁵)

3.1 Relevance/Coherence (Rating: ③⁶)

3.1.1 Relevance (Rating: ③)

3.1.1.1 Consistency with the Development Plan of Iraq

The national development plans and the development plans for the governorate/sectors both at the time of the appraisal and the time of the ex-post evaluation aim for reconstruction and economic development through road and bridge construction. Therefore, the consistency of the project with the country's development plan is high.

First, regarding the national development plan at the time of the appraisal, the *Second National Development Strategy* published in June 2005 designated the reconstruction/expansion of the road network including bridges as a top priority for a smooth implementation of reconstruction efforts in Iraq. At the governorate level, there was no development plan formulated by local governments; however, the road/bridge development plan and an action plan for Al Muthanna Governorate formulated in 2008 by the Roads and Bridges Directorate of MOCH ("RBD"), which was the department within the executing agency in charge of this project, state as the objectives of road/bridge development: the communication, security and stability, the delivery of ration-card items (i.e., items on a list of subsidized foods and produces), the transportation of goods arriving to the ports in the south from neighboring countries.

At the time of the ex-post evaluation, the *National Development Plan (2008-2022)* promotes various strategic goals under the slogans, "Establish the foundations of an effective development state with social responsibility" and "Post-recovery option." With respect to the development goal for the road/bridge sector, the Plan promotes: increasing the length of the road network, building a modern maintenance system for the entire road network, and implementing Traffic Control System in an integrated and precise manner. At the governorate level, the *Al Muthanna Governorate Development Plan (2018-2022)* designates "improving the transport network" as the top priority area, promoting the development and rehabilitation of road/bridge networks and the improvement of the efficiency of the operation and management of these networks to expand access to public services and improve living conditions in rural areas. Similarly, the goals stated in the *Al Muthanna Governorate Five-Year Plan (2018-2022)* of the RBD are the development and rehabilitation of road/bridge networks and the improvement of the efficiency of the operation and management of these networks.

3.1.1.2 Consistency with the Development Needs of Iraq

Although the conditions of the regional traffic have changed between the time of the appraisal and the time of ex-post evaluation, the consistency between the project and the

⁵ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

⁶ ④: Very High ③: High, ②: Moderately Low, ①: Low

development needs is high because we confirmed that the needs for the three bridges covered by the project (Samawah North Bridge, Mahdi Bridge, and Hilal Bridge) have remained high.

At the time of the appraisal, as discussed in “1.1 Background,” there was a high need for constructing bridges that would facilitate north-south traffic and the traffic in the region and have a capacity for large vehicles passage. According to the study at the time of the appraisal, the traffic volume on NH 8 within the city of Samawah in 2005 was approximately 16,000 vehicles/day, exceeding the traffic capacity (10,000 vehicles/day). Subsequently, the construction of NH 1 between Nasiriyah and Diwaniya was completed before the completion of this project, eliminating the need for north-south traffic to take a detour to NH 8. However, the traffic volume has increased due to increased economic activities in Al Muthanna Governorate as a result of reconstruction. This is indicated by large volumes of traffic from the city of Samawah to both Nasiriyah and Diwaniya (Table 1). The traffic volume increase in Al Muthanna Governorate is also shown in the number of vehicles registered in the governorate, which rose from 14,020 in 2015 to 51,707 in 2020 (excluding motorcycles).⁷ According to the RBD, in the city of Samawah, where Samawah North Bridge and Mahdi Bridge have been built, additional measures have been taken to prevent the crossing of the Euphrates from becoming a bottleneck, including the construction of several other bridges in addition to the bridges built under this project.⁸ With respect to the traffic within the governorate, there are transportation needs among regular vehicles and trucks between the city of Samawah and the districts/villages in the western/northwestern areas (where Hilal Bridge is located) and between the city and NH 1 and NH 8. Since factories and farmlands are located throughout the governorate, the transportation volumes for construction materials and produces are high (as shown in detail in Table 2; see Figure 1 for the locations of the bridges).

Table 1 Traffic volume of major roads around the city of Samawah

(Unit: vehicles/day)

Measurement point	Description	Traffic ⁽¹⁾
NH 8, Rumaitha weighing station	Northern area of the governorate; between Samawah and Diwaniya	53,781
NH 8, Daraji weighing station ⁽²⁾	Connecting NH 1 and the city center; between Samawah and Nasiriyah	38,115
Road No. 28, Mamlaha weighing station	Connecting the northwestern area of the governorate and the city center	11,727

Source: Data provided by the executing agency

Note:

(1) Measured between 6:00-18:00, May 22, 2022. The traffic volume is the total number of vehicles, not including motorcycles, bicycles, and pedestrians.

(2) For the Daraji district, the data can be compared to the traffic volume in 2004. The traffic volume between 6:00-18:00 was 12,436 vehicles on September 21, 2004, and 26,737 vehicles on May 22, 2022.

⁷ Data from the Central Organization for Statistics of Iraq. Data for and before 2014 were not available.

⁸ Beside this project, the Iraqi government constructed the following bridges within the city: Thawrat Al-Eshreen Bridge (Al-Mofawadhiya Bridge) (Steel bridge; constructed in the 1950s, repair work completed in February 2013), Al-Barboty Bridge (concrete, completed in March 2016), Al-Shuhada Bridge (concrete, completed in June 2011). In addition, a major interchange is being constructed on NH 8.

Table 2 Functions of the three target bridges at the time of ex-post evaluation

Bridge	Description
Samawah North Bridge (newly built)	Located at the northern entrance of the city of Samawah, the bridge is considered to be an important bridge for the entire governorate as it enhances the convenience of the transportation between Samawah and other cities, towns, and villages and improves the accessibility to the main hospital (Al-Hussain Teaching Hospital) located approximately 1 km from the bridge. This 400-bed hospital was built in the 1980s as part of the <i>Ten 400-bed Hospitals Project</i> assisted by the Japanese government and companies.
Mahdi Bridge (replaced a temporary bridge)	Located at the entrance to the city of Samawah from the northwestern and western areas, the bridge links the city directly to its surrounding districts, villages, farmlands, and farm roads on the other side of the Euphrates. Although its traffic density is not as high as Samawah North Bridge, the bridge is beneficial for the districts and villages located in the northwest of the city as it helps people to travel to the city center for various purposes and improves the traffic to NH 8, which connects the city to other cities and governorates in the south. It is also considered a shorter route to transport produce from farmland to urban areas.
Hilal Bridge (replaced a temporary bridge)	Located approximately 21 km northwest of the city of Samawah, the bridge provides a shorter route for people from the city of Samawah and its surrounding areas and farmland to cross to the Hilal district on the other side of the river. People use the bridge in daily life and for other purposes including going to the medical center located on NH 8. In addition, the bridge created a shorter route to transport construction materials (cement, gravel, etc.) and products (e.g., salt) to other governorates. There is a private water treatment plant and water supply station near the bridge. Many pickup trucks and water tankers cross the bridge every day to buy and refill water at this station.

Source: Interviews with the executing agency, on-site fieldwork

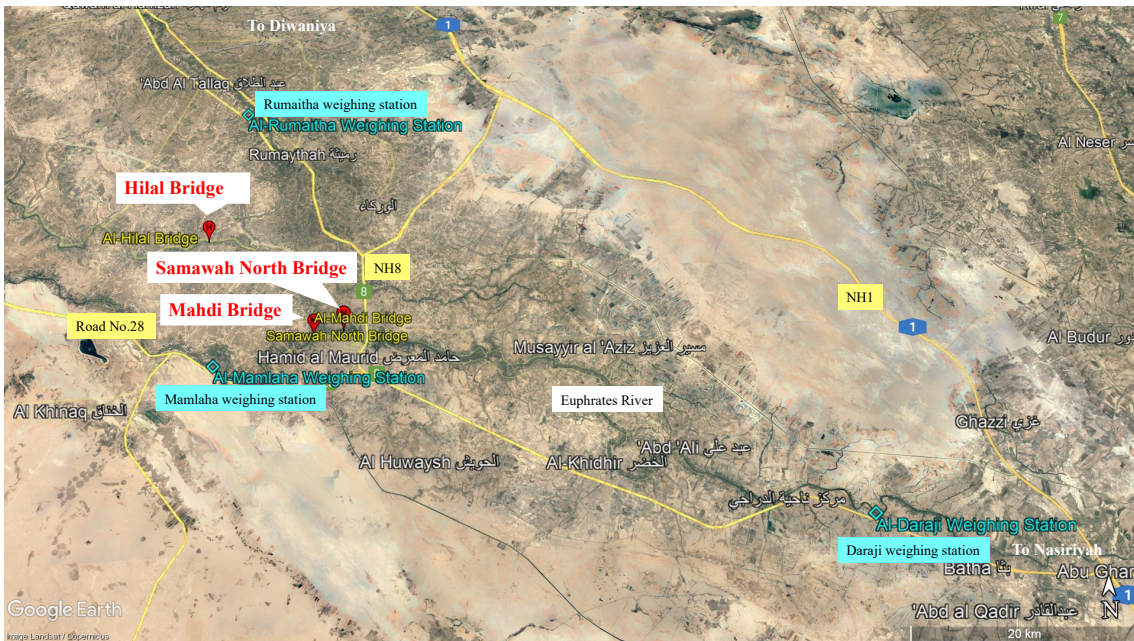


Photo credit: Google Earth

Figure 1 Major roads in Al Muthanna Governorate and the locations of the target bridges of the project

3.1.1.3 Appropriateness of the Project Plan and Approach

The project plan was appropriate. No particular issues are found with respect to the project's logic--to improve traffic flow and alleviate traffic congestion by constructing bridges. With respect to the implementation schedule of the project, however, despite the fact that the

situation was not stable, the project period was set based on almost the shortest possible period to complete paperwork and construction without expecting any possible extension in the project period. According to the interviews with the individuals who were involved in the project at that time, this reflected the Iraqi side's desire for early completion and was done in an effort to keep the interest during construction low. Thus, the decision was unavoidable. However, it was appropriate to set a long disbursement period, which was 10 years after the effective date of the loan agreement, in order to prepare for risks (for the project period, see also "3.2 Efficiency").

3.1.2 Coherence (Rating: ③)

3.1.2.1 Consistency with Japan's ODA Policy

The consistency with Japan's ODA policy at the time of the appraisal was high. In October 2003, at a donor conference in Madrid, Japan announced a \$1.5-billion Grant Aid for emergency reconstruction needs for Iraq and an ODA Loan of up to \$3.5 billion for mid-term reconstruction needs after 2005. This project forms part of this loan assistance. In addition, the *Medium-Term Strategy for Overseas Economic Cooperation Operations* (April 2005) by JICA (the former Japan Bank for International Cooperation (JBIC)) cites "assistance for building peace" as a priority area. Furthermore, one of the goals explicitly identified in the Strategy's discussion on the assistance policy for the Middle East is the mid- and long-term assistance to establish social stability and peace in Iraq. Thus these policies are consistent with this project, which assisted in the reconstruction of economic infrastructure in Iraq.

3.1.2.2 Internal Coherence

In this project, no specific collaboration or coordination with other JICA projects took place. Although it was planned at the time of appraisal that cooperation with the Third Country Training Program would be considered, it does not appear that any discussion took place to actually carry it out.

3.1.2.3 External Coherence

The external coherence is high. Cooperation and coordination with the humanitarian reconstruction aid by the JGSDF took place as intended at the time of the appraisal. This evaluation confirmed that these efforts have generated specific outcomes; i.e., the implementation of the project was prepared in such a way that the project would be implemented after the withdrawal of the JGSDF without any interruption, resulting in a smooth transition from the emergency aid to the mid- and long-term development phase. In addition, the fact that the bridges constructed in this project were put into use after and on top of the infrastructure rebuilt through the JGSDF aid helped advance economic and social

reconstruction and improve Japan's image. Although the roads rehabilitated through the JGSDF aid and the bridges constructed in this project are not connected directly, it is reasonable to assume that these enhancements reinforced each other to improve the traffic in Samawah.

In addition to such assistance, the project document at the time of appraisal also mentioned potential collaboration with the capacity building of MOCH through the World Bank's *Emergency Road Rehabilitation Project*. According to JICA and the RBD, no specific collaboration with the World Bank project has actually taken place, nor have individuals associated with the project participated in the training for the latter. However, the fact that the World Bank project rehabilitated some parts of the arterials in the Samawah area⁹ likely means that there was a synergistic effect in the end between the two projects in improving the traffic in Samawah.

Thus, this evaluation confirms that the project is consistent with the development plan and development needs of Iraq and Japan's ODA policy and that specific outcomes have been generated by the project by addressing collaboration and coordination with other non-JICA projects. Therefore, its relevance and coherence are high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

The outputs of the project consisted of the construction of three bridges in Samawah and their approach roads and consulting services. Although some changes were made, they were completed mostly as planned, and no issues are found with those changes.

As shown in the table below, the construction of the bridges and approach roads was completed mostly as planned. This was also visually confirmed at the time of the ex-post evaluation. Major changes in the scope included the elimination of decorations to save project costs and the change from pre-stressed concrete (PC) girders to steel girders in some parts to widen the opening of the mid-spans of Samawah North Bridge. These changes were made at the time of the detailed design or at later times in response to the requests from the Iraqi side and increases in project costs, and were adjusted so that they would not affect the achievement of the project objectives. Thus, these changes are appropriate. JICA also agreed to these changes as it did not find any issues.

⁹ Of the three locations for which traffic volumes are shown in Table 1, the Rumaitha and Daraji weighing stations are located within the road section that was repaired in the World Bank project.

Table 3 Output “Three bridges and approach roads in Samawah”: Plan vs. results

Bridge name	Plan at appraisal	Result
Samawah North Bridge (newly built)	PC girder Length: 240 m; width: 13 m (two lanes) Approach road: 1,200 m	PC girder, partially steel girder Length: 240 m; width: 13 m (two lanes) Approach road: 1,200 m
Mahdi Bridge (replacement)	PC girder; length: 192 m; width: 12 m (two lanes) Approach road: 360 m	PC girder; length: 192 m; width: 12 m (two lanes) Approach road: 360 m
Hilal Bridge (replacement)	PC girder; length: 192 m; width: 12 m (two lanes) Approach road: 480 m	PC girder; length: 192 m; width: 12 m (two lanes) Approach road: 460 m

Source: Documentation provided by JICA, documentation provided by and interviews conducted with the executing agency



Mahdi Bridge (source: ex-post evaluation team) Hilal Bridge (source: ex-post evaluation team)

The scope of work of the consulting services planned at the time of the appraisal included assistance on procurement (a review of the detailed design, preparation of tender documents, assistance on tender, and assistance on contracts), construction supervision, etc. Since the Iraqi side, in the beginning, had a policy not to generally hire outside consultants and had extensive experience in PC simple girder bridge construction projects, the detailed design itself was to be carried out by the executing agency. However, after the commencement of the project, detailed design was also added to the scope of work. This was in response to the fact that JICA, after reviewing the existing detailed design by the executing agency, formed an opinion that it did not meet the level of accuracy required for an ODA Loan and that the executing agency also determined that it would be desirable for smooth implementation of the project if the engineering team that created the detailed design would be involved all the way from the tender to construction supervision. With these changes and the delays in the project as will be discussed in “3.2.2.2 Project Period,” the volume of work significantly increased (at the time of the appraisal: 260 person-months; the result: approximately 1,005 person-months).

3.2.2 Project Inputs

(For details, see the final section of the report, “Comparison of the Original and Actual Scope of the Project.”)

3.2.2.1 Project Cost

The amount of the planned total project cost at the time of the appraisal was 4,473 million yen (of which the ODA Loan was 1,739 million yen for the amount paid in foreign currency and 1,609 million yen for the amount paid in local currency, for a total of 3,348 million yen). The actual amount of the total project cost was 4,430 million yen (of which the ODA Loan was 3,123 million yen paid in foreign currency), which was within the plan (99% against the plan).

Although the civil work cost increased due to project delays, this was addressed by eliminating some of the works in scope and using the contingency. In this project, the contingency ratio was set as high as 20% by taking into account the situation in Iraq, and this proved to be a good decision. With respect to the consulting services, the scope and volume of work increased as discussed above. However, since the original contract amount was lower than the plan due to competition, the cost remained within the amount that was originally planned even after an increase in the cost due to the amendments of the contract.

3.2.2.2 Project Period

It was specified that the project period for this project would commence on the signing date of the loan agreement and end on the delivery of the facilities. At the time of the appraisal, the project period was expected to be 58 months, from January 2008 to October 2012. In comparison, the actual project period was 125 months, from January 2008 to May 2018, which significantly exceeded the plan (216% against the plan).¹⁰ The bridges were completed in June 2015 (Mahdi Bridge), January 2016 (Hilal Bridge), and April 2018 (Samawah North Bridge).

Delays mainly occurred in the civil work phase. According to the RBD, they were caused by the insufficient capacity of the contractors (inadequate planning, management, coordination and a shortage of equipment/labor), a shortage of material suppliers, a shorter period of time available for work due to extreme heat, delays in approving designs/design modifications and the extension of the construction period. The area's safety had indirect impacts on the delays. It was reported in the documents from the time of the project and interviews with relevant parties that although there was no interruption in the construction due to security issues in Samawah, the bridge construction was delayed because, for example, buried objects, whose locations were unknown due to the loss of drawings due to fighting, were discovered only after drilling and had to be dealt with; workers were enlisted in the military during the period during which the fighting against the "Islamic State of Iraq and the Levant (ISIL) was taking place, causing a shortage of workers; payments were delayed because the Malaysian consultant could not issue the construction completion certificate as the consultant was not granted permission to travel to the site for security reasons; ISIL, which placed a dam on the upper Euphrates under its control, intentionally caused floods, delaying the piers construction; and there was a delay in customs clearance for steel girders, which the project decided to transport from Dubai to

¹⁰ A guarantee period of one year after delivery was set, and the term of the contract for the consulting services was scheduled to end at the expiration of the guarantee period (October 2013 (plan) / April 2019 (result)).

accommodate the design modifications for Samawah North Bridge (see “3.2.1 Project Outputs”).¹¹ In addition, it was also pointed out that, due to the relationship with the local tribe, even when the project was facing a shortage of workers, workers from other areas that belonged to other tribes could not be hired. However, the latter was an appropriate (and unavoidable) measure to help suppress destabilizing factors associated with the conflict.

It should be specifically pointed out that relevant parties including the executing agency and JICA made efforts to complete the project as early as possible even under such difficult circumstances. As will be discussed in more detail in “4.3 Lessons Learned” and “5. Non-Score Criteria,” the fact that the JICA Iraq office, with the monitoring support outsourced to the United Nations Development Programme (UNDP), continued to maintain close communication with the RBD seems to have constituted a major factor in facilitating the progress of the construction.

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

At the time of the appraisal, it was deemed impossible to calculate the Financial Internal Rate of Return (FIRR) for the lack of revenues from the project on its own and the Economic Internal Rate of Return (EIRR) for the lack of adequate data for the larger effects on the national economy and other aspects. Since the same conditions are present at the time of the ex-post evaluation, we did not calculate either FIRR or EIRR.

Therefore, the efficiency of the project is moderately low.

3.3 Effectiveness and Impacts¹² (Rating: ③)

3.3.1 Effectiveness

The intended direct outcomes of implementing the project were the “facilitation of north-south traffic in Iraq” and the “alleviation of traffic congestion in the city of Samawah.” The effects of both outcomes have manifested. With respect to the first outcome, although the needs for utilizing the three bridges under this project for north-south traffic have diminished (see “3.1.1.2 Consistency with the Development Needs of Iraq”), it is reasonable to consider that the first direct outcome has been achieved since the three bridges are adequately used as the economic activities in the area became more active.

¹¹Although steel girders were delivered to the site by the end of 2014, the construction of the bridge and associated structures required a longer time due to factors mentioned above including the capacity of the contractors, weather conditions, travel restrictions for the consultant. Moreover, it also took time to eliminate some parts of the scope and amend the contract to accommodate the increased project cost caused by the delay, resulting in a project period that significantly exceeded the plan.

¹² When providing the sub-rating, Effectiveness and Impacts are to be considered together.

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

In this project, an “annual average daily traffic” was set for each of the three bridges as the indicator for quantitative effects. We have examined this indicator by deeming it to be both the operation indicator and effect indicator for direct outcomes. As shown in the table below, it has been confirmed that the outcomes were mostly achieved for 2019, i.e., the target year, and achieved at a level exceeding the plan for 2022, the year in which the ex-post evaluation was conducted.

First, with respect to the results for the target year, we used 2019 (i.e., one year after the actual project completion) as the target year¹³ because even though the target year was set to 2013 (i.e., one year after the project completion) at the time of the appraisal, the actual project completion was in 2018. The comparison of the traffic volume as measured in September 2019 to the target as set for 2013 (using the data obtained from the RBD) indicate that the level of achievement was 118% for Samawah North Bridge, 66% for Mahdi Bridge, and 77% for Hilal Bridge. Next, with respect to the results for 2022, i.e., the year in which the ex-post evaluation was conducted, the results of simple traffic surveys the ex-post evaluation team conducted in May 2022 indicated that the 2022 results achieved all the target numbers by large margins. The observed results seem to reflect the fact that even though the opening of NH 1 has reduced the need for north-south traffic to detour to Samawah, as discussed in “3.1.1.2 Consistency with the Development Needs of Iraq,” the number of registered vehicles in Al Muthanna Governorate and the traffic volume in Samawah have both significantly increased.

The traffic volume data for 2019 consisted of 7-hour or 12-hour traffic volumes for five days, and the 2022 data consisted of the peak-time traffic volumes for one or two days. Since we have converted these data into daily average volumes to compare them to the target, the converted values may not be accurate values. However, since all measurements represent normal traffic conditions on weekdays with no special events, it may be reasonable to expect that there is no significant discrepancy with the actual conditions.

With respect to the project’s effect in facilitating the alleviation of traffic congestion, no indicators for traffic congestion in the city were set at the time of the appraisal, nor were we able to obtain quantitative data at the time of the ex-post evaluation. However, at the time of the on-site fieldwork and simple traffic surveys in May 2022, no traffic congestion was observed at any of the bridges, and vehicles could travel smoothly at normal speeds. Therefore, it is reasonable to consider that traffic congestion has been alleviated.

¹³ Although the year of completion varied from bridge to bridge, since the project completion year was 2018, we use 2019 as the common target year. Since the targets were set by distributing the projected future traffic volume across the road network, including the three bridges and an existing bridge (Samawah Bridge), it seemed reasonable to obtain the results for the period after all three bridges had been completed.

Table 4 Annual average daily traffic (operation and effect indicator)¹⁴

(Unit: vehicles/day)

Annual average daily traffic ⁽¹⁾	Baseline value	Target value	Actual value	
	2004	2013 1 Year After Completion	2019 ⁽²⁾ 1 Year After Completion	2022 ⁽³⁾ 4 Years After Completion
Samawah North Bridge	0	8,707	10,254	29,114
Mahdi Bridge	2,435	4,577	3,025	6,831
Hilal Bridge	937	1,762	1,364	4,562

Source: Documentation provided by JICA, documentation provided by the executing agency, simple traffic surveys by the ex-post evaluation team

Note:

(1) Total number of passenger vehicles and large vehicles (buses, trucks).

(2) The values for 2019 are based on the traffic survey data (September 22-26, 2019) provided by the RBD. The actual measurements for the 7-hour or 12-hour traffic at each bridge have been converted to daily average volumes using the proportion of these time ranges as reported in the existing survey results for nearby roads for which actual 24-hour traffic volume measurements were available (as shown in Table 1). Since data were available for five weekdays for each bridge, we used the averages of these data.

(3) The values for 2022 are based on the simple traffic surveys (May 15-18/30-31, 2022) by the ex-post evaluation team. The peak-time traffic volumes (8-9 A.M. and 2-3 P.M.) for one or two weekday(s) in which the traffic volume is normal have been converted to daily average volumes using the proportion of these time ranges as reported in the existing survey results for nearby roads for which actual 24-hour traffic volume measurements were available (as shown in Table 1). Each bridge was measured for two days. With respect to Samawah North Bridge and Mahdi Bridge, however, there was a sand storm in one of these two days, causing low visibility and a temporary holiday; for this reason, the measurements from that day are not included in the values under "Results."

3.3.1.2 Qualitative Effects (Other Effects)

The expected qualitative effects at the time of the appraisal were: (1) improvement in roadside environments (noise and air pollution caused by traffic congestion), (2) improvement in traffic safety, (3) stimulation of the economy and industry, creation of jobs, (4) strengthening of the systems for implementation and operation and maintenance at MOCH, and (5) improvement in the image of Japan in the Samawah area. Based on the subject matters of each effect, this section (Effectiveness) examined Item (2). Item (3) will be examined in "3.3.2.1 Intended Impacts," and Items (1), (4), and (5) will be examined in "3.3.2.2 Other Positive and Negative Impacts."

(2) *Traffic Safety*, along with convenience, improved for both vehicles and pedestrians, indicating that this qualitative effect has manifested. At the time of the project completion, the

¹⁴ The target traffic volumes included in the table were set based on the assumption that future traffic volumes would increase 4% per year. As reference information, we calculated the projected traffic volumes for 2019 and 2022 by assuming that the bridges under this project had been completed in 2012 as scheduled and the traffic volumes thereafter have increased 4% per year as projected. As a result, as shown in the table below, the achievement level of the projected values on average for the three bridges was 69% for 2019 and 174% for 2022. The achievement level for 2019 falls slightly short of "mostly achieved," but the results for 2022 support the conclusion that the achievement level exceeded the plan.

Vehicles/day	Target	Projected values by assuming 4% annual increase		Results	
	2013	2019	2022	2019	2022
Samawah North Bridge	8,707	11,017	12,393	10,254	29,114
Mahdi Bridge	4,577	5,791	6,514	3,025	6,831
Hilal Bridge	1,762	2,229	2,508	1,364	4,562

RBD reported that traffic accidents had gone down as a result of this project by reducing the long travel time caused by poor road conditions and long-distance travel and that all residents in the target area could now use all-weather roads, allowing them to use basic services including clinics, schools, markets, etc. It was confirmed in the on-site fieldwork and the interviews with the RBD conducted at the time of the ex-post evaluation that these situations have continued to exist. We were told that no traffic deaths have occurred since project completion on or near the three bridges. The pedestrian space of each bridge is sufficient, in good condition, and free of obstacles.

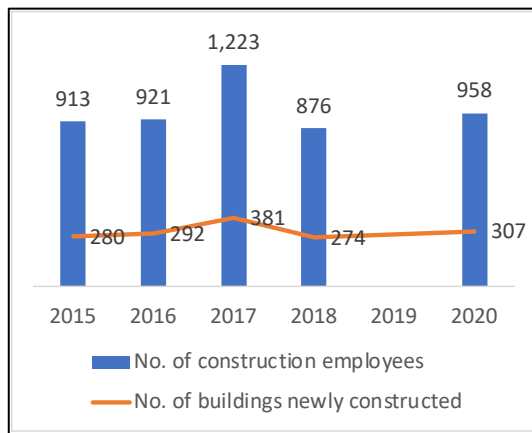
3.3.2 Impacts

3.3.2.1 Intended Impacts

The impact of the project, as intended at the time of the appraisal, “contribution to the economic and social reconstruction of Iraq” (corresponding to (3) *stimulation of the economy and industry, creation of jobs* among the five qualitative effects identified above,) has been confirmed qualitatively. First, according to the RBD and comments from Al Muthanna Governorate obtained through the RBD, this project has provided shorter routes to Samawah and to other areas in the governorate and NH 1, reduced travel and transportation costs, and addressed an increase in the transportation of raw materials and agricultural/industrial products. Al Muthanna Governorate, as one of the governorates in Iraq with a large amount of mineral resources including limestone (a raw material for cement) and sodium, has a comparative advantage in the production and transportation of construction materials. Each bridge has important purposes as shown in Table 2, and we have confirmed that these purposes are being served.

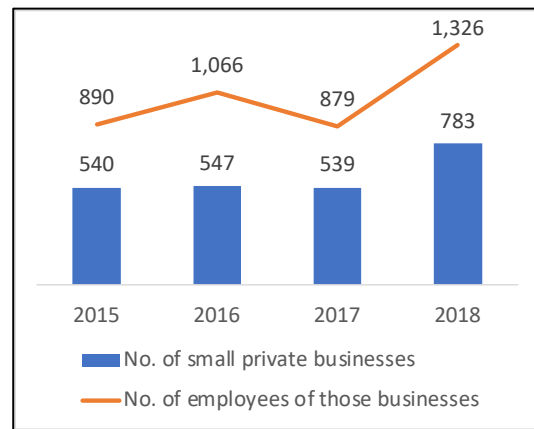
However, these positive impacts have not shown up in the statistical data yet. Although available statistics for Al Muthanna Governorate indicate that the economy and industry in the governorate have become more active after the end of the Iraq War, we did not find any data indicating that further development has taken place after this project or that the project had positive impacts. For example, an increase in the number of registered vehicles as shown in “3.1.1.2 Consistency with the Development Needs of Iraq,” a stable number of building constructions as shown in Figure 2, and an increase in small private businesses as shown in Figure 3 (consistent data were not available for medium- and large-sized companies) indicate that the economic activities in the governorate have grown. Since the three bridges under this project constitute some of the major roads in Samawah, it is reasonable to assume that they are being used for economic activities and the daily life of residents, making the comments above by the RBD and Al Muthanna Governorate plausible. At the same time, however, the unemployment rate in 2021 was 27%, which did not improve over 24% in 2008 and was significantly higher than the national average in 2021, 14.2%. The fact that this is one of the

areas with the highest unemployment rates in Iraq has not changed since the time before the project.¹⁵



Source: Compiled using data from the Central Organization for Statistics

Figure 2 Number of building constructions in Al Muthanna Governorate



Source: Compiled using data from the Central Organization for Statistics

Figure 3 Number of small private businesses in Al Muthanna Governorate

3.3.2.2 Other Positive and Negative Impacts

1) Impacts on the Natural Environment

This project does not fall under the large-scale project in the road sector as defined in the *Japan Bank for International Cooperation Guidelines for Confirmation of Environmental and Social Considerations* (formulated in April 2002), is not considered as a project with a significant adverse impact on the environment, and does not fall under “projects with sensitive characteristics” or “projects located in or near sensitive areas” as defined in the *Guidelines*. For this reason, this project was classified as Category B. The areas close to the project site are not dense residential areas and are mostly farmlands and idle lands. Thus, it was not expected that there would be any significant adverse impact caused by air and noise pollution.

No Environmental Impact Assessment (EIA) report was created for this project as one was not required under the domestic laws of Iraq. According to the RBD, in implementing the project, the executing agency and the consultant monitored the project in accordance with the environmental checklist agreed upon by JICA and the executing agency at the time of the appraisal and the *National Emissions Regulation based on the Law No. 27 of 2009 on the Protection and Improvement of the Environment* formulated in 2009. It was also reported that, after the project completion, the RBD and the environment office of Al Muthanna Governorate have implemented monitoring and alleviation measures in accordance with the *Environmental and Social Considerations Plan*. Interviews with the RBD revealed no major problems based

¹⁵ The 2001 data for Al Muthanna Governorate were provided by the RBD. The 2008 data for Al Muthanna Governorate and the national data were data from the Central Organization for Statistics.

on the monitoring results. Among the qualitative effects as intended at the time of the appraisal, the data for (1) *improvement in roadside environments (noise and air pollution caused by traffic congestion)* were unavailable. However, it is reasonable to believe that the elimination of traffic congestion has improved the conditions.

2) Resettlement and Land Acquisition

For this project, it was expected to acquire a total of approximately 10 ha of privately owned farmland at locations where approach roads were to be constructed. The acquisition was carried out in accordance with domestic laws as agreed at the time of the appraisal. According to the RBD, although some hindrances were present in the beginning (e.g., failing to agree on the terms for cutting down the date palms planted at the site), all issues have been resolved by partially changing the retaining wall design and through other means. There was no resettlement.

3) Gender Equality, Marginalized People, Social Systems and Norms, Human Well-being and Human Rights, and Other Impacts

These aspects are not specifically mentioned in the documents at the time of the appraisal, and the examination at the time of the ex-post evaluation did not find any results that could be considered in the evaluation. However, as mentioned in “3.1.1.2 Qualitative Effects (Other Effects),” the bridges under this project provide access to all residents in the target area. In addition, according to the RBD, the project plan and facility designs are not designed in a way that would cause disadvantages to some residents. Therefore, it is reasonable to say that this project has, at least, not had negative impacts, such as not providing benefits to certain groups.

4) Other Positive and Negative Impacts

Ancillary positive effects of the project include:

- Strengthening of the systems for implementation and operation and maintenance at MOCH (*Qualitative effect (4)*) as intended at the time of the appraisal): With respect to the project implementation capacity, UNDP provided training for it to the project management team in the RBD as part of the monitoring support the JICA Iraq office outsourced to UNDP. The program of the training, which was designed to be practical by incorporating issues that the team was facing at a given time, helped strengthen the capacity of the RBD, which did not have any experience in implementing a project under an international contract. The training received high marks from the Iraqi government. With respect to the system for operation and maintenance, although we were not able to verify whether the system itself has been strengthened, the RBD reported that the consultant provided a variety of training during the project implementation, strengthening the capacity of the staff.

- Improvement in the image of Japan in the Samawah area (*Qualitative effect (5)* as intended at the time of the appraisal): According to the RBD, the residents in Al Muthanna Governorate and the city of Samawah has, from the time when the JGSDF was stationed to the time of the ex-post evaluation, had a positive image of Japan. This has been confirmed by the government of Al Muthanna Governorate and UNDP, which was providing monitoring support at the site. In other words, the image of Japan, which had already been improved as a result of the assistance the JGSDF provided, was maintained and further improved by implementing this project right after it.

Thus, among the objectives of the project, the direct outcomes, “facilitation of north-south traffic in Iraq” and the “alleviation of traffic congestion in the city of Samawah,” have been mostly achieved. The intended impact, “contribution to the economic and social reconstruction of Iraq,” has been achieved to a certain extent, and other positive impacts have also been confirmed. Therefore, as intended effects have manifested mostly as planned as a result of implementing the project, the effectiveness and impacts of the project are high.

3.4 Sustainability (Rating: ③)

3.4.1 Policy and System

As discussed in “3.1.1 Relevance,” the policies of the Iraqi government and the governorate government at the time of the ex-post evaluation emphasized the maintenance of roads and bridges. Therefore, policies and systems for operation and maintenance are in place.

3.4.2 Institutional/Organizational Aspect

The system for the operation and maintenance of the project was mostly as intended at the time of the appraisal. The RBD is in charge of the operation and maintenance of the bridges located along all national highways and major roads in Iraq, and the operation and maintenance of the bridges under this project fall under the jurisdiction of the RBD’s regional office in the Al Muthanna Governorate office. With respect to maintenance, the RBD is responsible for inspections and repairs, while the cleaning of the pavement is carried out by the city of Samawah.

The RBD’s regional office in Al Muthanna Governorate has 57 employees, and 24 of them (three engineers, three surveyors, and assistants) are involved in the implementation and operation and maintenance of national projects, including the bridges under this project (the remaining 33 employees are responsible for the implementation and operation/maintenance of governorate-level projects). The RBD recognizes that the number of employees available for operation and maintenance is limited, and it reported that it is considering to appoint additional personnel.

Thus, although the institutional and organizational aspect of the operation and maintenance has some minor issues, there are good prospects for improvement/resolution.

3.4.3 Technical Aspect

At the time of the appraisal of this project, the RBD was developing national highways across the country and did not have any technical concerns with respect to the construction of PC bridges as it had extensive experience with this type of construction. It was also confirmed in the interviews with the RBD for the ex-post evaluation that the RBD's regional office in Al Muthanna Governorate had an adequate level of technical proficiency. The RBD has reported that people with sufficient years of experience have been hired as technical personnel and that these employees have received training from the Iraqi government (MOCH's Training and Development Center) and international organizations (including the World Bank) multiple times by the time of the ex-post evaluation.¹⁶ In addition, the bridge maintenance manual created by the project consultant continues to be used. A portion of Samawah North Bridge was changed from PC girders to steel girders. The RBD's regional office reported that this did not pose any issue as this office had experience in maintaining steel girders.

Thus, the technical aspect of operation and maintenance has been established.

3.4.4 Financial Aspect

For 2015 and thereafter, a total of 140,309,000 USD of the national government's budget has been allocated to the RBD's monitoring and maintenance budget. The monitoring and maintenance expenses of each regional office are disbursed from this budget each year. For the Fiscal Year 2019, this budget was 27,961,000 USD for the whole country. Although other data regarding the amount were not available, the RBD reported that the allocated amount for the maintenance budget was insufficient. However, the three bridges under this project, which have been monitored semi-annually, have not required any repairs so far, incurring no actual expenditure for maintenance. In addition, the RDB also reported that a special budget would be allocated in the event any major or medium-scale emergency repair, including with these bridges, becomes necessary. The RDB explained that although such a budget is limited in terms of the amount and is allocated in accordance with the priority based on the degree of impact and other factors, a budget that is not approved for a given year would be prioritized for the following year, ensuring that a problem would not be left unaddressed for a long time.

Thus, although the financial aspect of operation and maintenance has some minor issues, there are good prospects for improvement/resolution.

¹⁶ At the time of the appraisal, it was recommended, based on the lessons identified in the ex-post evaluations of similar projects in the past, to include training for smooth facility operation and maintenance as a project activity. As discussed in "3.3.2.2. Other Positive and Negative Impacts," this has actually taken place, strengthening the capacity of the staff.

3.4.5 Environmental and Social Aspect

As already discussed, no negative environmental or social impacts are found. Given the nature of the project, these impacts should not require any special attention.

3.4.6 Preventative Measures to Risks

No specific risks to operation and maintenance are found.

3.4.7 Status of Operation and Maintenance

With respect to the maintenance plan for the three bridges under this project, regular monitoring of these bridges and other roads and bridges in the same jurisdiction (visual inspection, reporting of problems, traffic volume surveys, collection of traffic congestion and accident information, etc.) is performed by incorporating it in the annual maintenance plan of the RBD's regional office in Al Muthanna Governorate. At the time of the ex-post evaluation, no issues to be addressed have been reported as a result of the monitoring. The on-site fieldwork by the ex-post evaluation team also confirmed visually that both the superstructure (including road surface) and the substructure of all three bridges are in good conditions.

Thus, the status of operation and maintenance is satisfactory.

Slight issues have been observed in the institutional/organizational and financial aspects of the operation and maintenance of this project; however, there are good prospects for improvement/resolution. Therefore, the sustainability of the project effects is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project aimed to facilitate north-south traffic in Iraq and alleviate traffic congestion in the city of Samawah by constructing three bridges with a capacity for large vehicle passage and other structures in the city and its surrounding areas within Al Muthanna Governorate in southern Iraq. The project plan was consistent with Iraq's development policy and development needs and Japan's ODA policy, and the project generated positive outcomes by deliberately cooperating and coordinating with the humanitarian reconstruction aid by the JGSDF. Therefore, the relevance and coherence of the project are high. The objectives of the project were also mostly achieved. As a result of implementing the project, the traffic volumes on the three bridges have exceeded the plan by the time of the ex-post evaluation, eliminating the traffic congestion. Although the intended impact, i.e., contribution to the economic and social reconstruction of Iraq, was not verified quantitatively, it was qualitatively verified that the project successfully responded to an increased level of economic activities in Al Muthanna Governorate and helped improve the convenience of everyday life. Therefore, effectiveness and impacts are high. Efficiency is

moderately low because the project period significantly exceeded the plan. Although the project had minor issues with respect to the placement of maintenance/administrative personnel as well as with the budgetary aspect, it is expected that these aspects will improve to allow the continuation of the project effect. Therefore, sustainability is high.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

The RBD is recommended to continue to conduct systematic monitoring of the bridges under this project and maintain a system that is capable of swiftly responding in the event of a problem.

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

(1) Measures for reducing risks in assisting a conflict-affected country

Identified below are examples of how this project has, and how it should have, reduced or removed destabilizing factors associated with a conflict-affected country and how this project has, and how it should have, used stabilizing factors. Since the circumstances of conflict-affected countries vary a great deal and it is difficult to generalize their experiences, we will simply list examples (note that the list below includes items that are included only in “5. Non-Score Criteria”).

- The project gained significant support in the target area by providing uninterrupted assistance by initiating its preparation and creating a schedule so that the emergency/reconstruction aid would transition seamlessly into development and by setting the subject of the project to the development of transportation infrastructure, an area with high development needs and significant benefits to both civic and economic activities. (Promotion of the project effect through the application of stabilizing factors)
- There were risk factors for delays, including political instability, a shortage of workers, and the lack of information regarding the locations of buried objects due to the loss of drawings due to fighting (buried objects were discovered only after drilling). At the time of the appraisal, the project unavoidably set a short construction period because the counterpart government’s desire for early completion precluded a conservative schedule. In consideration of this, the project set a long disbursement period, which was 10 years. The project, despite substantial delays, was completed within that period, thus reducing administrative procedures caused by the delay. (Reduction of negative impacts to the project by addressing destabilizing factors)

- Because the project set a high contingency ratio, 20%, in consideration of political instability, the project was able to appropriate the contingency against the cost increase due to the extension of the project period. This was one of the reasons why the project cost did not exceed the plan.¹⁷ (Reduction of negative impacts to the project by addressing destabilizing factors)
- As a risk factor for delays prior to the signing of an exchange of notes, the new government, which was just inaugurated, did not have any experience in signing a diplomatic document and had not established a process for it, making it necessary for the two governments to discuss the signing and the scope of endorsement. A lesson has been learned that preparing a project in a country with a new constitution or government carries such risk for delays prior to the signing of an exchange of notes. (Reduction of negative impacts to the project by addressing destabilizing factors)
- The project managed to overcome issues during the period in which JICA was not able to visit the project site due to safety concerns by outsourcing monitoring support to UNDP, which had local staff members who could visit the site and had extensive experience working with the Iraqi government. (Reduction of negative impacts to the project by addressing destabilizing factors)
- Even though the tribe in the target area did not have a sufficient number of workers, the project could not hire workers from the tribes in other areas (this was an appropriate measure to avoid creating destabilizing factors). The estimate for the availability of workers should have been made by taking into account the configuration of tribes and the relationship between tribes. (Reduction of negative impacts to the project by addressing destabilizing factors; avoiding the creation of additional destabilizing factors)

(2) Measures at the time of launching a project in a country with little experience in Japanese ODA Loans

This project was one of the first Japanese ODA Loans in Iraq. Listed below are the lessons that are specifically associated with this aspect. As with the first lesson, since it is difficult to generalize these experiences, we will simply list examples (note that the list below includes items that are included only in “5. Non-Score Criteria”).

- It was discovered after the project was started that even though the executing agency had extensive experience in designing and implementing projects in the relevant sector, it lacked the accuracy that was needed to meet the requirements of a Japanese ODA Loan. It would have been more desirable to fully consider, at the initial stage, whether detailed design (not just its review) should be included in the scope of work of the consulting services.¹⁸

¹⁷ There are likely to be cases where the counterpart country’s government does not agree to an increase in the contingency as it can lead to an increase in the loan amount.

¹⁸ There are likely to be cases where it is not desirable, in light of political circumstances, for a consultant to create the detailed design.

- The monitoring committee meetings between the Japanese government and the counterpart government that was held quarterly by bringing together the parties involved in all Japanese ODA Loan projects in Iraq motivated these parties and facilitated the progress of the project.
- In projects, such as this project, that are small-scale and lack preceding projects, even if a joint venture with contractors from developed countries is used, the construction tends to be carried out mainly by local contractors due to low incentives for such foreign contractors. One of the risk factors for delays was the unfamiliarity with the procedures for international contracts. The latter aspect was addressed by detailed supervision of the implementation, including the service contract with UNDP.

(3) Avoiding the impact of design changes for some bridges on the entire project period in projects involving multiple bridges

While the project experienced significant construction delays on all three targeted bridges due to a combination of factors (contractor capacity, weather, consultant travel restrictions, etc.), there were also variations in progress by bridge. The completion date for each bridge was 2015 for Mahdi Bridge, 2016 for Hilal Bridge, and 2018 for Samawah North Bridge, with the delays for Samawah North Bridge being particularly noticeable. The difference between Samawah North Bridge and the other bridges in terms of delay factors was that a part of the main girder of Samawah North Bridge was changed from PC girder, which can be procured domestically, to steel girder, which needs to be imported, and the customs clearance was delayed due to the deteriorating security situation. This, combined with the above-mentioned delay factors that had also occurred in other bridges, increased the delay, and it also took time to cancel some scopes and contract amendments to cope with the increased project cost due to the delay, resulting in the project period being significantly longer than planned.

Therefore, when making design changes to some bridges in a project involving multiple bridges, it is necessary to realistically estimate the time required for new processes, such as the transportation of materials, to determine how much the delay in completing the bridge in question will affect the overall project period and whether this is commensurate with the benefits to be gained from the design changes (in the case of this project, the use of steel girders to lengthen the center span, thereby improving the convenience of using the water surface). Furthermore, it would be desirable to take into account how the assumed risk of delay and the benefits to be gained differ for each material when selecting the type of bridge girder at the outline and detailed design stages.

5. Non-Score Criteria

5.1 Performance

5.1.1 Objective Perspective

The evaluation confirms that JICA played roles expected for a project-related agency and contributed to the results. Even though this project was one of the first Japanese ODA Loans in

Iraq, it was successfully completed and produced effects by taking measures that were aligned with the circumstances of the country and the target area (ensuring the continuity of assistance by coordinating the schedule with the withdrawal of the JGSDF, designing a development project that succeeded the emergency/reconstruction aid, providing prior notification by aligning it with the timing of the official inauguration of a new government, conducting elaborate monitoring that was also assisted by UNDP, etc.).

The evaluation also deems that the project had an adequate system of supervision, which took into consideration the changes in the project environment. Although no major changes occurred in the project environment during its implementation, the JICA Iraq office initially did not have local staff, and there were periods during which its personnel (Japanese persons) was not able to visit the site for safety reasons (note that the latter issue no longer exists at the time of the ex-post evaluation). This evaluation gives high marks to the fact that the project overcame this problem by sending UNDP's local staff to the site through a service contract with UNDP.

It appears that the maintenance of communication and the building of a cooperative relationship with the executing agency were carried out at a satisfactory level. The distance to the site made communication between relevant parties difficult, and, within the executing agency, there was a miscommunication between the ministry and the project management team at the sites; however, the JICA Iraq office, with the assistance of UNDP, maintained close contact with both the ministry and the project management team and attended all relevant meetings to coordinate the opinions of these parties.

Monitoring Support by UNDP

Between 2009 and the time of the ex-post evaluation, the JICA Iraq office has had a service contract with UNDP's Iraq office on monitoring support for ongoing ODA Loans, through which UNDP, as a neutral third-party organization, has checked and reported on the status of the site when JICA was unable to visit it, facilitated the project's progress in the quarterly monitoring committee meetings, provided coordination between the Iraqi government and JICA, assisted and provided training to the Iraqi government on procedures for project implementation, conducted performance evaluations, etc. Because the Iraqi government did not have any experience in implementing a project under an international contract and there were periods during which the JICA office was not able to access the site, this arrangement helped the progress of the project and capacity building of the Iraqi government.

5.1.2 Subjective Perspectives (retrospective)

We interviewed former project staff at JICA and the UNDP staff member who was in charge of the outsourced monitoring support and asked them to reflect on the situation during the project. The following discussion describes the situation from the perspectives of these former staff members. It shows that they assisted, in a less than satisfactory security situation, an executing agency that was implementing an ODA Loan project for the first time and worked on the project to complete it while facing difficult circumstances.

(1) Formation and Planning of the Project

<Accounts by Former JICA staff members>

During the second half of 2005, rumors began to circulate in the area that the JGSDF would be withdrawn from Samawah, and the local press began to take the tone of “Will Japan be gone from Samawah?” It was important to make a transition from the assistance by the JGSDF to a more general mechanism for development. To this end, preparations were made so that project approval and prior notification by the Japanese government could be completed before the JGSDF’s withdrawal from Samawah in July 2006. It was necessary to provide a new assistance project also in terms of ensuring a safe withdrawal of the JGSDF. At the same time, since it was expected that the government would have new members upon the inauguration of the official government in May 2006, the prior notification had to be made to the official government. Under these conditions, preparations were made at unprecedented speed, with the completion of JICA’s outline design in July 2005, the delivery of a list of ODA Loan requests from the Iraqi government in October, intergovernmental consultation in December, dispatching of the JICA appraisal mission in the following year in January-February 2006, and prior notification in June.

The Iraqi side, due in part that this was its first-ever Japanese ODA Loan, indicated that the project period proposed by JICA was too long. One of its comments was, “We can get it done in two years if we construct it ourselves (so why would it take more than four years?)” In consideration of the circumstance at that time, we felt that even that project period was not long enough; however, we dealt with the situation by setting a long disbursement period, not the project period, as a conservative construction period would increase the interest during construction.

The project made progress as expected up to the prior notification, but it halted at the next stage, the exchange of notes. Because the new Iraqi government had never signed a diplomatic document, the Iraqi government and the Ministry of Foreign Affairs of Japan had to discuss the signing process. JICA and the World Bank also joined the discussion and studied the new constitution together, but the discussion took more than one year to complete.

(2) Implementation of the Project

<Accounts by Former JICA staff members>

The loan agreement was signed in January 2008 and became effective in June. In March 2009, the JICA Iraq office was established. Our initial task was to understand who were involved in the project and how they were involved and to establish communication channels. At that time, since the office did not have any local staff and overnight stays were not allowed in the southern region for safety control reasons, we had to visit Samawah on one-day trips, making it difficult to grasp the conditions of the site. For this reason, we outsourced monitoring support to UNDP and had UNDP’s local employees visit the site.

The contract for the project, which was awarded to a U.S.-owned company and an Iraqi company, was structured in a way so that the construction would be mainly carried out by the

Iraqi company. As a result, the contract amount was very low, much lower than expected. Looking back from the time of the ex-post evaluation, we feel that such a situation would not be unusual for projects in Iraq and that a project with approximately 3 billion yen in the contract amount would be considered small by international contractors and would not provide much incentive to them. In fact, delays occurred due to the lack of workers, funds, etc., on the part of the contractor. Moreover, there also were delays due to external factors beyond the control of the project, such as the extreme heat that made the construction impossible, or the increased level of ISIL's activity that prevented the Malaysian consultant from staying at the site. The JICA office frequently met with both the ministry, served as the executing agency, and the field team and repeatedly explained the benefits that would be realized once the project was completed. There were times when the leader of the executing agency's field team was stressed for not being able to communicate adequately with the ministry due to the distance between the site and Baghdad. We moved the process forward by always talking to and encouraging this leader whenever he visited Baghdad. At the time of the ex-post evaluation, we still maintain a good relationship with this leader, staying in touch through social networks.

After this process, Mahdi Bridge was completed in June 2015, and Hilal Bridge was completed in January 2016. At that time, Samawah North Bridge was passable, but it took another two years for the construction to complete. We remember that the cost increase due to delays made it necessary to eliminate portions of the scope to avoid cost overrun, but this discussion was not easy.

<Accounts by the UNDP staff member in charge of the outsourced monitoring support>

As part of the monitoring support UNDP provides, we are under contract to hold quarterly meetings of the ODA Loan monitoring committee between the Japanese government and the Iraqi government. Since relevant parties involved in all ODA projects came together at these meetings, a person reporting a delay had to do so in front of all attendees. This probably motivated them to make progress by setting the quarterly reporting as a target. We feel that compared to other donors, the JICA office was characterized by its detailed involvement in the project through frequent meetings with the executing agency and that this facilitated the progress of the project.

(3) Project Completion

<Accounts by Former JICA staff members>

The last bridge, Samawah North Bridge, was completed in April 2018. An initial staff member: "It even feels like a miracle that we managed to achieve project completion." Multiple staff members: "This is one of the projects that we have fond memories of. We are very pleased to learn from this ex-post evaluation that these bridges are being fully used."

<Accounts by the UNDP staff member in charge of the outsourced monitoring support>

We provide monitoring support for all Japanese ODA Loan projects in Iraq, but we had an impression that this project was "a small but demanding project." But we believe that its impacts,

including the elimination of traffic congestion, are noticeable. Our local employees checked on the bridges recently when they visited Samawah and reported that they were in good condition.

5.2 Additionality

The added value of this project, as already discussed, has been the uninterrupted provision of assistance since the JGSDF's assistance in Samawah. This enabled a seamless transition from the emergency/reconstruction aid to development assistance, helped the project gain the trust of the residents of the target area, and improved the convenience for the residents.

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
1. Project Outputs		
New construction of three bridges and approach roads for each bridge in Samawah	Samawah North Bridge (PC girder, bridge length 240 m, approach road 1,200 m) Mahdi Bridge (PC girder, bridge length 192 m, approach road 360 m) Hilal Bridge (PC girder, bridge length 192 m, approach road 480 m)	Samawah North Bridge (PC girder/steel girder, bridge length and approach road length were as planned) Mahdi Bridge (as planned) Hilal Bridge (PC girder, bridge length as planned, approach road 460 m)
Consulting Services	Assistance with procurement, construction supervision, etc. Total: 148 person-months	Detailed design, assistance on procurement, construction supervision, etc. Total: 1,004.63 person-months
2. Project Period	January 2008- October 2012 (58 months)	January 2008- May 2018 (125 months)
3. Project Cost		
Amount Paid in Foreign Currency	1,739 million yen	3,123 million yen
Amount Paid in Local Currency	2,734 million yen (34,047 million Iraq Dinar (IQD))	1,310 million yen (15,384 million IQD)
Total	4,473 million yen	4,430 million yen
ODA Loan portion	3,348 million yen	3,120 million yen
Exchange Rate	1IQD = 0.0803 yen (As of January 2006)	1IQD = 0.085150751 yen (Average for 2008-2018)
4. Final Disbursement	January 2018	

Republic of Iraq

FY2021 Ex-Post Evaluation Report of Japanese ODA Loan
“Irrigation Sector Loan”

External Evaluator: Masami Tomita, i2i Communication, Ltd.

0. Summary

This project aimed to revitalize existing irrigation drainage canals and irrigated farmland by providing equipment and machinery used for irrigation and drainage throughout Iraq. The relevance and coherence of the project are high, as the project plan is consistent with the development plans and needs of Iraq and Japan’s ODA policy, and as collaboration was achieved with a technical cooperation project of the Japan International Cooperation Agency (JICA). However, the area benefited from the project has not increased since the time of the project appraisal, and the total annual volume of water pumped of the drainage pumps installed in the project is significantly below the target volume. Although the improvement in the maintenance status of existing irrigation drainage canals and water conveyance efficiency was qualitatively confirmed, the achievement of the production target by major crops varied widely by region and crop, and the effect of the project on the revitalization of irrigated farmland appears to be limited. Regarding the expected impact of the project, i.e., contribution to Iraq’s economic and social recovery through the revival of its irrigated agriculture, although it is presumed that the project has contributed to a certain extent, the degree of contribution could not be clearly confirmed. Therefore, the effectiveness and impacts of the project are moderately low. The efficiency of the project is moderately low because the project period significantly exceeded the plan. Sustainability of the project effects is moderately low because there are some problems with institutional/organizational aspects of operation and maintenance (O&M) and the maintenance status and for low prospects for improvement and resolution.

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

1. Project Description



Project Locations (source: 3kaku-K)



East Gharraf Drainage Pump Station
(source: Ex-Post Evaluation Team¹)

¹ The photo was taken by DIJLAH Company for Engineering Consultancies Ltd. (local consultant).

1.1 Background

Annual rainfall in Iraq is low, about 600 mm in the north and about 200 mm in the rest of the country, and irrigated agriculture is indispensable in many regions. However, at the time of the project appraisal (2006), only 35% (1.93 million ha) of the irrigable land (5.5 million ha) in Iraq was being irrigated. In addition, due to many years of conflicts and economic sanctions, adequate maintenance had not been conducted, leaving irrigation and drainage pumps in disrepair, and coupled with a lack of materials and equipment, irrigation drainage canals had not been thoroughly maintained. As a result, the country's irrigation capability was significantly declining, and there was a fear that if nothing was done to alleviate this situation, the irrigated area of the land used for farming would further decrease. Meanwhile, in Iraq, the United Nation's Oil For Food Program (hereinafter referred to as "OFFP")² ended in 2003, and the need to improve food self-sufficiency through agricultural revitalization became increasingly important. Thus, it was necessary to revitalize the existing irrigation drainage canals and irrigated farmland by procuring irrigation and drainage pumps, and equipment and machinery used for maintenance and dredging of irrigation drainage canals. This project was implemented under these circumstances as one of the first Japanese ODA loan projects in Iraq when the international community's assistance to the country was shifting from emergency and recovery assistance to development assistance.

1.2 Project Outline

The objective of this project is to revitalize the existing irrigation drainage canals and irrigated farmland by providing equipment and machinery necessary for irrigation and drainage throughout Iraq, thereby contributing to Iraq's economic and social recovery through the revival of its irrigated agriculture.

Loan Approved Amount/ Disbursed Amount	9,514 million yen / 9,376 million yen
Exchange of Notes Date/ Loan Agreement Signing Date	January 2007 / January 2008
Terms and Conditions	Interest Rate 0.75% Repayment Period 40 years (Grace Period 10 years) Conditions for Procurement General Untied

² The OFFP was implemented from 1996 to 2003 based on the UN Security Council Resolution 986 of April 1995, which, in view of the plight of the Iraqi people, allowed Iraq to export oil on a limited basis to enable it to purchase humanitarian supplies such as food and medicine. (Source: website of the Ministry of Foreign Affairs, URL: https://www.mofa.go.jp/mofaj/press/danwa/17/dga_0908.html (accessed on September 5, 2022))

Borrower / Executing Agency	The Government of the Republic of Iraq / Ministry of Water Resources (MOWR)
Project Completion	December 2017
Target Area	Throughout Iraq
Main Contractors (Over 1 billion yen)	Sumitomo Corporation (Japan), Toyota Tsusho Corporation (Japan), Coelmo Società a responsabilità limitata (Italy), Al Mabrook Construction Contracting Co. Ltd. (Iraq) / JSM Ltd. (Japan) / Kubota Corporation (Japan) (JV)
Main Consultants (Over 100 million yen)	Nippon Koei Co., Ltd. (Japan) / Dar AI-Handasah Consultants (Lebanon) (JV)
Related Studies (Feasibility Studies, etc.)	<ul style="list-style-type: none"> • Special Assistance for Project Formation (SAPROF) for Irrigation Sector Loan Project • Special Assistance for Project Implementation (SAPI) for “Irrigation Sector Loan” The Republic of Iraq
Related Projects	<p>[Technical Cooperation]</p> <ul style="list-style-type: none"> • Third Country Training Program “Water Management in Irrigated Farms” (2006-2008) • “Project for Spreading Water Users Associations for the Efficient Use of Irrigation Water” (2012-2015) <p>[ODA Loan]</p> <ul style="list-style-type: none"> • “Irrigation Sector Loan” (Phase 2) (May 2018)

2. Outline of the Evaluation Study

2.1 External Evaluator

Masami Tomita, i2i Communication, Ltd.

2.2 Duration of Evaluation Study

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

Duration of the Study: January 2022 – January 2023

Duration of the Field Study: March 27, 2022 – March 31, 2022, August 22, 2022 – August 25, 2022 (Meetings with the local consultant in the third country (Jordan)) (The field study

conducted by the local consultant: May to June, 2022)³

2.3 Constraints during the Evaluation Study

In this ex-post evaluation, the local consultant conducted the field survey under the direction of the evaluator because the evaluator was unable to conduct the survey in Iraq due to security reasons. While pump stations targeted by the project are located in Wasit and Thi Qar governorates, the local consultant conducted the survey only in Thi Qar governorate due to security reasons. For Wasit governorate, officers in charge at the Kut regional office of MOWR were invited to Baghdad for an interview. Due to the lack of field visits by the evaluator, it was not possible to obtain sufficient information, especially on the effectiveness of the project (irrigated areas benefited from the project, cultivated areas, production volume and unit yield of major crops, specific improvement status of soil salinity in the benefited areas, etc.) and the impact (average farm income per household). For data for which information was lacking, measures were taken to the extent possible, such as qualitative confirmation through interviews with the executing agency and supplementing information through the use of publicly available statistical data, etc. For data for which accuracy was deemed insufficient, trends were extrapolated from figures that were (or considered to be) accurate.

The equipment and machinery for the maintenance of irrigation drainage canals procured under the project (18 types in total) were distributed to 15 governorates. However, taking into account the security issues in Iraq, it was rather challenging to examine the effect of using procured equipment in all 15 governorates. Therefore, interviews with the MOWR headquarters and the officials in charge of regional offices of Wasit and Thi Qar governorates were used to verify, to the extent possible, the status of equipment utilization and the extent to which maintenance status of irrigation drainage canals has been improved through the use of equipment procured under the project.

3. Results of the Evaluation (Overall Rating: C⁴)

3.1 Relevance/Coherence (Rating: ③⁵)

3.1.1. Relevance (Rating: ③)

3.1.1.1 Consistency with the Development Plan of Iraq

At the time of the project appraisal, the *National Development Strategy (2005-2007)* pointed out the importance of agriculture in the Iraqi economy and the need for irrigation development. The Strategy focused on rehabilitation of irrigation infrastructure, including desalination of saline soils of farmland, improvement of agricultural production technology, and agricultural research.

³ Some of the interviews with the executing agency were conducted online by the ex-post evaluator.

⁴ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

⁵ ④: Very High, ③: High, ②: Moderately Low, ①: Low

In addition, in the development plan of MOWR (2004-2008), the Ministry regarded rehabilitation of existing irrigation and drainage facilities, procurement of equipment and machinery necessary for maintenance of irrigation canals, etc., replacement of deteriorated pumps, and capacity development in O&M at MOWR as highly important projects, and identified a total of 262 subprojects for implementation including the above-mentioned projects, from which high-priority subprojects were identified as potential targets of this project.⁶

At the time of the ex-post evaluation, in the *National Development Plan (2018-2022)*, the importance of agriculture in the Iraqi economy remained high, and the goals for the agricultural sector during the period of the Plan included (1) increasing the share of the agricultural sector in the gross domestic product (non-oil economy) to 5.2% by 2022 (from 4.5% in 2015), (2) increasing food self-sufficiency, and (3) securing sustainable amount of water for agricultural, industrial, and domestic use and improving the water balance by reducing annual water demand by 500 million cubic meters. In addition, the *Strategy for Water and Land Resources in Iraq (2015-2035)* (hereinafter referred to as “*SWLRI*”), developed mainly by MOWR, predicts that water inflows into Iraqi rivers in 2035 will decrease by about 30% compared to 2015 due to the development of water resources in upstream countries such as Turkey and Syria. Thus, as a strategy to reduce agricultural water consumption while ensuring water and food security, the Strategy proposes to improve irrigation efficiency for effective water use, increase cropping intensity, complete irrigation of a total of 3.23 million ha of farmland, and increase the area under cultivation. To achieve this strategy, a total of 142 irrigation projects have been selected, including the rehabilitation of existing dams, weirs, regulating reservoirs, pump stations, and canals, and the development of agricultural drainage networks, and the priority areas include Wasit and Thi Qar governorates covered by the project.⁷

Therefore, the project is highly consistent with the development plans of Iraq both at the times of the project appraisal and the ex-post evaluation.

3.1.1.2 Consistency with the Development Needs of Iraq

At the time of the project appraisal, as mentioned above, the breakdown of irrigation and drainage pumps and the lack of maintenance of irrigation drainage canals had worsened due to long years of conflict and economic sanctions, and irrigation capability had deteriorated

⁶ Subsequently, SAPROF was conducted, and based on its results and discussions with the Iraqi side, it was decided to select about eight pump stations, about 30 items of equipment and machinery for the maintenance of irrigation drainage canals, and about 60 generators from among the priority subprojects identified. From the viewpoint of the urgency of the support, etc., the loan agreement was signed under the condition that MOWR would prepare the Implementation Plan (IP) for the selection of specific prospective subproject sites and contents after the start of the project and submit it to JICA, and JICA's consent must be obtained. After the project started, the baseline survey (procurement support study) was conducted (June-December 2008) and a draft IP was prepared, which was reviewed and revised by MOWR and submitted to JICA as the official IP in March 2009, which was concurred by JICA.

⁷ Source: *SWLRI (2015-2035)* pp. 48-50, *Data collection survey on water resource management and agriculture irrigation in the republic of Iraq - Final Report (2016)* pp.37, 125-127

significantly; thus there was a high need for the provision of irrigation and drainage equipment and machinery.

Moreover, as shown in Table 1, irrigation and drainage pump stations and canals have been steadily developed since the time of the appraisal, indicating the importance of the development of irrigation and drainage facilities in Iraq at the time of the ex-post evaluation.

Table 1: Development of Irrigation and Drainage Facilities in Iraq at the Time of Appraisal and Ex-post Evaluation

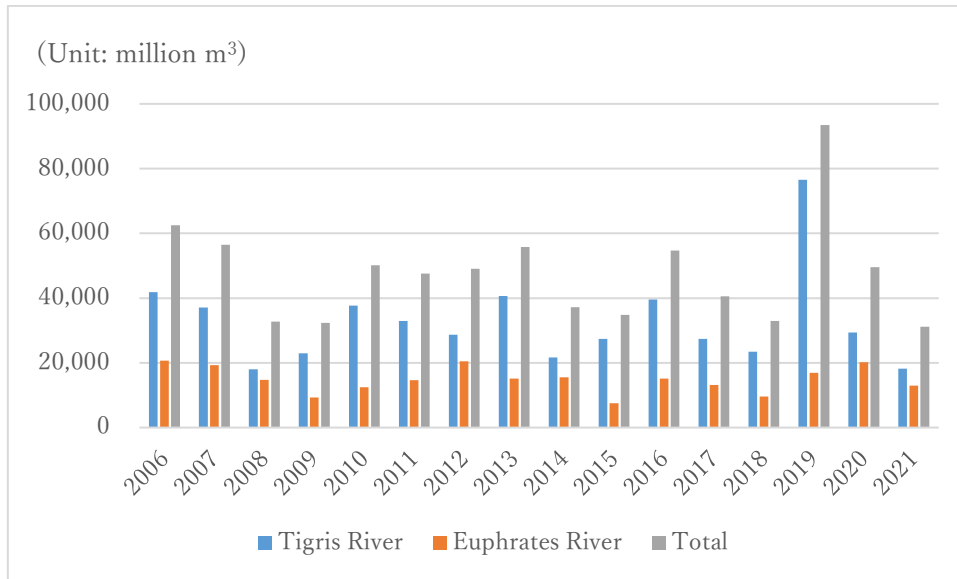
	Appraisal (2006)	Ex-post Evaluation (2022)
Number of Irrigation Pump Stations	90	172
Number of Drainage Pump Stations	84	90
Length of Irrigation Canals	46,600 km	53,000 km
Length of Drainage Canals	85,000 km	97,000 km

Source: documents provided by JICA and MOWR

In addition, as shown in Figure 1, although the flows of the Tigris and Euphrates rivers fluctuate considerably from year to year depending on the climate conditions and rainfall, river inflows into Iraq have been decreasing year by year due to the development of water resources in the upstream countries that started in the 1970s, and except for 2019 when rainfall was particularly high, flows that were already declining at the time of the appraisal have further declined in recent years,⁸ and this has also reduced the amount of water available for agricultural use in Iraq. Therefore, a more efficient use of water resources is required at the time of the ex-post evaluation. Furthermore, in Iraq (especially in the central and southern regions), the salinity of irrigation water has been increasing due to the decrease in river flow,⁹ and there is a high need for improving irrigation and drainage facilities.

⁸ The median total flow for the period 2006-2013 (eight-year total) is 49,615 million m³ while the median total flow for the period 2014-2021 (eight-year total) is 38,865 million m³.

⁹ According to the *National Development Plan (2018-2022)*, the salinity of the Tigris River is projected to increase from 320 ppm (at the time of preparing the plan) to 500 ppm (2035) and the salinity of the Euphrates River from 540 ppm (at the time of preparing the plan) to 930 ppm (2035).



Source: data provided by MOWR

Figure 1: Flow of the Tigris and Euphrates Rivers in Iraq

Regarding the considerations for and fairness to marginalized people, there is no mention of these aspects in the appraisal documents. According to MOWR and the consultants who were involved in the project, while there were no discussions with JICA regarding the fairness to the poor and other groups at the time of the appraisal or during the implementation of the project, there were no situations where certain beneficiaries were excluded from water rights as a result of the implementation of the project, and the project did not disadvantage marginalized people including the poor.

Therefore, the project is highly consistent with the development needs of Iraq both at the times of the project appraisal and the ex-post evaluation.

3.1.2 Coherence (Rating: ③)

3.1.2.1 Consistency with Japan's ODA Policy

In the International Conference on Reconstruction in Iraq held in Madrid in October 2003, the Japanese government announced that it would provide a total of 3.5 billion dollars in ODA loans to support medium-term reconstruction beginning in 2005, in addition to grand aid amounting to 1.5 billion dollars to meet urgent reconstruction needs in Iraq. Moreover, in the Medium-Term Strategy for Overseas Economic Cooperation Operations of JICA (formerly Japan Bank for International Cooperation (JBIC)) (April 2005), support for global issues and peacebuilding was one of the priority areas, and support for the reconstruction of Iraq's economic infrastructure was consistent with this policy, as its society was still in a state of instability after the conflict.

3.1.2.2 Internal Coherence

At the time of the project appraisal, since the project was expected to consider collaboration with JICA through the Third Country Training programs, etc., the project was expected to generate synergistic effects between it and such training programs.

JICA conducted the Third Country Training Program “Water Management in Irrigated Farms” (2006-2008) (commonly known as “Karbala Project”) in Jordan for Iraq, and implemented the “Project for Spreading Water Users Associations for the Efficient Use of Irrigation Water” (2012-2015) to spread the results of the training program throughout the country. The project aimed to improve the capacity of agriculture-related organizations to properly guide irrigation water management by water users’ associations (WUAs) at pilot sites in a total of 15 governorates through training in third countries and Japan. According to interviews with consultants involved in the project and the results of the ex-post evaluation of the project,¹⁰ the maintenance equipment and machinery procured under the ODA loan project were managed by the regional offices of MOWR as WUAs lacked capacity to handle them, and, as a result, there was no direct collaboration with the technical cooperation project. However, effects on the technical cooperation project through indirect collaboration with the loan project were observed: the proper dredging of canals through the use of the equipment and machinery by MOWR contributed to the proper distribution of water (proper use of irrigation water) to each WUA district covered by the technical cooperation project.

3.1.2.3 External Coherence

At the time of the project appraisal, the United States and the Food and Agriculture Organization of the United Nations (FAO) were implementing projects in Iraq to improve facilities such as irrigation canals and irrigation and drainage pump stations, and this project sought to avoid duplication with assistance provided by other donors by collecting information on projects already implemented or planned by them. In addition, while MOWR presented high-priority subprojects as candidates for this project from among the total of 262 subprojects listed in the Ministry’s development plan (2004-2008), SAPROF selected the subprojects for the project with “no overlap with other donors” as one of the selection criteria. During the project implementation, MOWR managed the project to ensure that there was no duplication or discrepancy between different projects implemented by multiple donors. Thus, from the time of the appraisal to the completion of the project, duplication with other donor support was avoided in this project.

This project is highly consistent with the development plans and needs of Iraq both at the

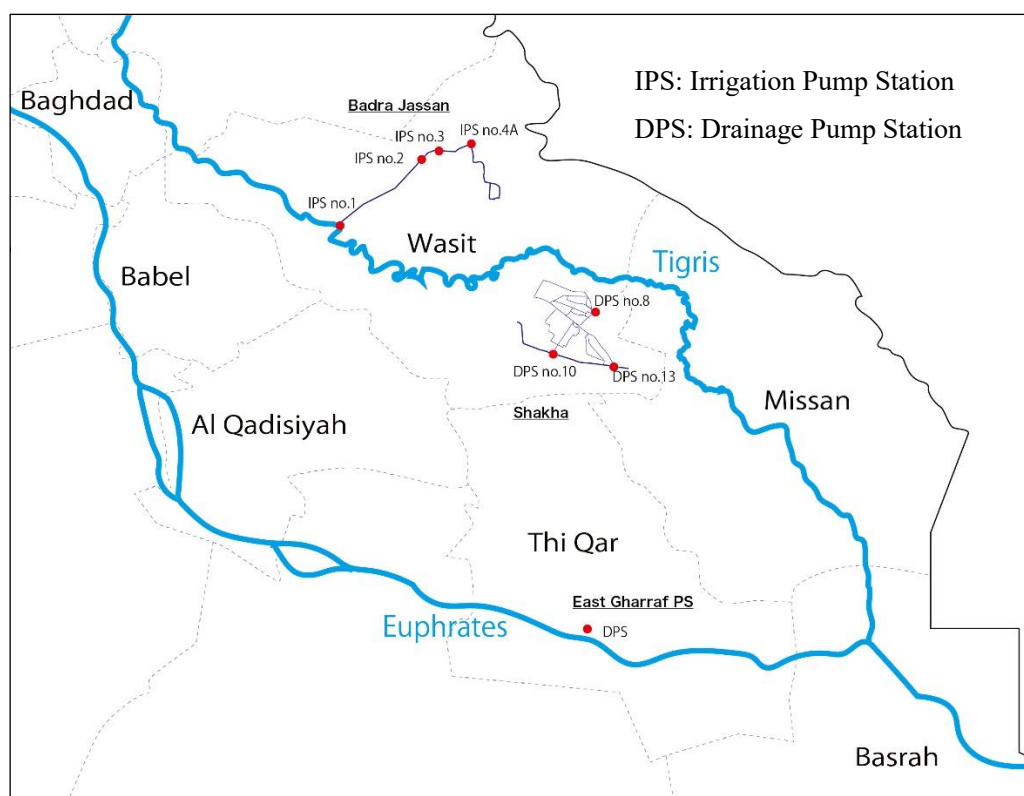
¹⁰ The ex-post evaluation of the project was being conducted as of September 2022.

times of the project appraisal and the ex-post evaluation, as well as Japan's assistance policy at the time of the appraisal. Moreover, internal coherence exists, and no issues are found with respect to external coherence. Therefore, its relevance and coherence are high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

The location map of the project's pump stations is shown below.



Source: 3kaku-K (prepared by the evaluator based on the map in the project completion report (PCR))

Figure 2: Project Location Map

The outputs following the implementation of this project are shown in Tables 2 through 4.

Table 2: Renewal of Irrigation and Drainage Pumps

Location	Plan	Actual
Badra Jassan Irrigation Pump Station No.1	Irrigation pump 2 sets (Discharge 3.0 m ³ /s)	Irrigation pump 2 sets (Discharge 3.4 m ³ /s)
Badra Jassan Irrigation Pump Station No.2	Irrigation pump 2 sets (Discharge 3.0 m ³ /s)	Irrigation pump 2 sets (Discharge 3.4 m ³ /s)
Badra Jassan Irrigation Pump Station No.3	Irrigation pump 2 sets (Discharge 3.0 m ³ /s)	Irrigation pump 2 sets (Discharge 3.2 m ³ /s)
Badra Jassan Irrigation Pump Station No.4A	Irrigation pump 2 sets (Discharge 3.0 m ³ /s)	Irrigation pump 2 sets (Discharge 3.4 m ³ /s)
Shakha Drainage Pump Station No.8	Drainage pump 5 sets (Discharge 1.5 m ³ /s)	Drainage pump 5 sets (Discharge 1.5 m ³ /s)
Shakha Drainage Pump Station No.10	Drainage pump 3 sets (Discharge 1.25 m ³ /s)	Drainage pump 3 sets (Discharge 1.0 m ³ /s)
Shakha Drainage Pump Station No.13	Drainage pump 4 sets (Discharge 2.2 m ³ /s)	Drainage pump 6 sets (Discharge 2.2 m ³ /s)
East Gharraf Drainage Pump Station	Drainage pump 5 sets (Discharge 6.5 m ³ /s)	Drainage pump 5 sets (Discharge 6.0 m ³ /s)
N/A (Portable/Standby)	Metric pump 20 sets (Discharge 1.0 m ³ /s)	Metric pump 20 sets (Discharge 1.0 m ³ /s)

Source: documents provided by JICA and MOWR

Irrigation and drainage pumps were renewed mostly as planned. The reason why the actual number of pumps at Shakha Drainage Pump Station No. 13 increased by two sets from the plan is that since the existing number of pumps was six sets from the beginning, the plan should have stated six sets, but the implementation plan (IP) stated four sets instead.

Table 3: Procurement of Equipment/Machinery for Maintenance of Irrigation Drainage Canals

Equipment/Machinery	Plan	Actual
1. Sheep Foot Roller	5	5
2. Steel Roller	5	5
3. Concrete Truck Mixer	8	21
4. Grader	7	7
5. Trailer (with prime mover)	9	9
6. Water Tanker	14	14
7. Fuel Tanker	20	20
8. Hydraulic Excavator	9	9
9. Long Boom Hydraulic Excavator	10	10
10. Wheel Loader	9	19
11. Movable Workshop	2	5
12. Concrete Plant	2	Mobile Batching Plant 8^{*1}
13. Hydraulic Lift	7	Truck Crane 7^{*2}
14. Bulldozer (39-ton class)	6	6
15. Bulldozer (20-ton class)	10	10
16. Dump Truck	20	20
17. Submersible Pump	20	20
18. Wheel Excavator	-	22

Source: documents provided by JICA and MOWR

Note: *1: While the plant was planned as a fixed type at the time of the appraisal, a mobile type was purchased because a mobile type was more convenient for the maintenance of irrigation drainage canals. Six of the mobile batching plants are mobile dosing stations.

*2: While hydraulic lifts were planned at the time of the appraisal, the specifications were changed to truck cranes for convenience.

A total of 54 additional pieces of equipment and machinery (13 concrete truck mixers, three movable workshops, ten wheel loaders, six mobile dosing stations, and 22 wheel excavators) were procured for the maintenance of irrigation drainage canals using the remaining funds from the ODA loan.

Table 4: Procurement of Generators for Pumps
(Number of units)

Capacity	Plan	Actual
1. 50 kVA	9	0
2. 150 kVA	4	2
3. 250 kVA	2	2
4. 350 kVA	3	3
5. 500 kVA	6	1
6. 750 kVA	2	2
7. 1,000 kVA	19	23
8. 1,200 kVA	1	0
9. 1,250 kVA	6	0
10. 1,500 kVA	8	10
11. 2,500 kVA	-	2
Total	60	45

Source: documents provided by JICA and MOWR

The generators were procured using the project funds, the Iraqi government's own funds, and other donor funds. The number of generators for which the project was responsible decreased by 15 units due to delays in the procurement process in the project.

Consulting services included tendering support and construction management. The actual person-month was 269 person-months (43 foreign and 226 local) compared to the planned total of 157 person-months (54 foreign and 103 local). The overall person-months increased due to the extension of the contract period. The reason for the decrease in person-month for foreigners and the increase in person-month for locals was that the person-month for foreigners needed to be reduced and those for locals needed to be increased due to the deteriorating security situation and the need for more person-month to upgrade pump equipment.

In all cases where the output was changed, any increase or decrease was based on reasonable reasons and such changes were made after they were examined and agreed upon between the executing agency and JICA. Thus, no particular problems are found with these changes.



Drainage Pumps Installed under the Project
(source: Ex-Post Evaluation Team)



Transformer Installed under the Project
(source: Ex-Post Evaluation Team)

3.2.2 Project Inputs

3.2.2.1 Project Cost

The planned project cost at the time of the project appraisal was 12,685 million yen (9,430 million yen in foreign currency and 3,255 million yen in local currency), of which 9,514 million yen was covered by the ODA loan. The actual project cost was 9,389 million yen (9,376 million yen in foreign currency and 13 million yen in local currency), of which 9,376 million yen was covered by the ODA loan, well within the plan (74% of plan). According to the JICA officials who were in charge at the time of the project implementation, the reasons why the actual project cost was much lower than the planned amount were as follows: (1) In implementing the very first Japanese ODA loan project in Iraq under an unstable security situation, stakeholders believed that service delivery would be possible even in areas and locations where contractors could not operate due to security concerns by using an equipment/machinery procurement package that allowed MOWR transport and install on its own, and that transportation and installation could be added to the main contract should security be restored later on; (2) Although transportation cost, including customs duties, was estimated to be higher than expected, the transportation went more smoothly than expected due to the efforts of MOWR; and (3) some of the equipment that was planned to be procured was repaired rather than procuring new equipment.

3.2.2.2 Project Period

The project period planned at the time of the project appraisal was 54 months in total from January 2008 (signing of the loan agreement) to June 2012 (completion of the procurement and installation of equipment and machinery as well as consulting services); however, the actual project period was 120 months in total from January 2008 (signing of the loan agreement) to December 2017 (completion of the procurement and installation of equipment and machinery),

which significantly exceeded the plan (222% against the plan). However, according to the United Nations Development Programme (UNDP) Iraq Office, which was engaged in the monitoring of the project, the security situation deteriorated during the project implementation due to the invasion by the “Islamic State of Iraq and the Levant (ISIL),” which led to a national budget shortage due to a significant increase in military spending and drops in oil prices since 2015. The bidding process was suspended from August 2015 to February 2016 (for a total of seven months) due to the inability to secure project funds for this project, and the project site was closed for about three months in the summer of 2016 due to the lack of budget, which resulted in delayed salary payments to local civil servants and demonstrations. If we deduct from the actual project period the ten-month period in which project implementation was suspended due to the worsening security situation by assuming that this was caused by an external factor, the actual project period would be 110 months (204% against the plan). The reasons why the actual project period significantly exceeded the plan are as follows.

The significant delays in the bidding and contract procedures were due to the following reasons: (1) The Iraqi side was unfamiliar with these processes, as this was its first Japanese ODA loan project (e.g., it took time to process foreign exchange losses and respond to frequent requests from the top officials at MOWR for explanations regarding many procedures stipulated in the JICA guidelines); (2) The consultants explained the bid evaluation results, including the JICA guidelines, to the evaluation committee members. However, since the members were selected from various departments of the Ministry, the meetings of the evaluation committee were rarely held due to scheduling conflicts of the members;¹¹ and (3) Additional procurement of equipment and machinery for the maintenance of irrigation drainage canals was made using the remaining funds from the ODA loan.

The major delay in pump installation was due to the following reasons: (1) Although the pump installation had to be carried out when the farmers, who were the users of the facilities, were not using the irrigation and drainage pumps, MOWR had difficulty in coordinating with the farmers regarding the construction schedule, etc.; and (2) It was difficult for the consultants to stay at the construction sites due to security and budget constraints. Therefore, the consultants’ site visits were limited to confirming the progress of the construction works. At the same time, errors occurred between design drawings and the dimensions of the actual structures, often resulting in inconsistencies between existing civil engineering structures and the dimensions of newly procured equipment, which took time to resolve.¹²¹³

While the actual project period significantly exceeded the planned period even after taking

¹¹ Source: SAPI Final Report pp.3-6

¹² Source: SAPI Final Report pp.1-2, 3-7

¹³ Since Lots 2, 3, and 4 included the delivery of equipment to the ISIL invasion area, the deteriorating security situation might have affected the procurement of equipment and machinery. However, the specific length of the delay caused by it could not be confirmed.

into account the worsening security situation, with a view to prevent further extension of the project period, MOWR requested support from other ministries and local government agencies for smooth implementation of the project and discussed and coordinated with contractors and experts from other ministries on issues that arose at the project sites as needed.

Table 5: Comparison of the Project Period

Content	Plan	Actual
Selection of Consultant	May 2008 – April 2009 (12 months)	April 2009 – May 2010 (14 months)
Consulting Service	April 2009 – June 2012 (39 months)	July 2010 – September 2016 (75 months)
Bidding/ Contracting	June 2009 – June 2010 (13 months)	Lot 1: May 2009 – April 2012 (36 months) Lot 2: May 2009 – December 2012 (44 months) Lot 3: May 2009 – April 2012 (36 months) Lot 4: June 2009 – January 2010 (8 months) Lot 5: March 2014 – August 2016 (30 months)
Procurement/ Installation of Equipment and Machinery	June 2010 – June 2012 (25 months)	Lot 1: December 2012 – December 2016 (49 months) Lot 2: March 2012 – December 2013 (22 months) Lot 3: July 2012 – November 2013 (17 months) Lot 4: October 2010 – June 2013 (33 months) Lot 5: January 2016 – December 2017 (24 months)

Source: documents provided by JICA and MOWR

Note: Lot 1: irrigation and drainage pumps, Lot 2: equipment and machinery for the maintenance of irrigation drainage canals, Lot 3: generators, Lot 4: metric pumps and submersible pumps, Lot 5: additional procurement using the remaining funds from the ODA loan (maintenance equipment and machinery)

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

At the time of the project appraisal, the economic internal rate of return (EIRR) was expected to be 21% for Badra Jassan Irrigation Pump Stations No. 1 and No. 2, and 20% for Badra Jassan Irrigation Pump Stations No. 3 and No. 4A. However, the EIRR at the time of the ex-post evaluation cannot be calculated because data on cropping intensity, prices by crop other than wheat and barley, production costs, etc. for the benefited areas at the time of the ex-post evaluation were not available.

While the project cost was within the plan, the project period significantly exceeded the plan. Therefore, efficiency of the project is moderately low.

3.3 Effectiveness and Impacts¹⁴ (Rating: ②)

3.3.1 Effectiveness

The project aimed to “revitalize the existing irrigation drainage canals and irrigated farmland” as a direct outcome. The effectiveness was examined through the following quantitative effect indicators and qualitative validation.

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

1. Irrigated area benefited from the project (operation indicator)

Although the baselines of the areas benefited from the project had been specified in the IP as shown in the table below, no targets had been set at that time. The targets in the table below, which were set by the consultant at the time the PCR was prepared (2017), are presented here only as reference because they cannot simply be compared with the baselines due to significant deviations from the baselines and an unknown calculation method. Regarding the actual figures, with the exception of Badra Jassan Irrigation Pump Station No. 4A, figures that were (or presumed to be) highly accurate were not available. The actual figures are between 52% and 100% against the baselines and have not increased since the time of the appraisal. This is due to the fact that, according to MOWR, the Ministry of Agriculture (MOA) determines the area for agricultural use according to the amount of available water given that the amount of river inflows into Iraq is decreasing year by year and the country is facing severe water shortages. MOWR also explained that the actual figures for Shakha Drainage Pump Stations were the same as the baselines because the area used for farming was set at the same level as the level at the time of the appraisal due to severe water shortages. However, considering the fact that the actual figures tended to be lower than the baselines in Badra Jassan, it is reasonable to assume that the actual figures are below the baselines in Shakha as well.

¹⁴ When providing the sub-rating, Effectiveness and Impacts are to be considered together.

Table 6: Irrigated Area Benefited from the Project

(Unit: ha)

Pump Station	Baseline	<i>Target</i>	Actual		
	2008	2020	2019	2020	2021
			1 year after completion	2 years after completion	3 years after completion
Badra Jassan Irrigation Pump Station No. 1	6,250	9,700	5,600	5,600	5,600
Badra Jassan Irrigation Pump Station No. 4A	12,500	N/A	6,487	8,682	8,419
Shakha Drainage Pump Station No. 8	19,175	40,700	19,175	19,175	19,175
Shakha Drainage Pump Station No. 10	7,500		7,500	7,500	7,500
Shakha Drainage Pump Station No. 13	19,000		19,000	19,000	19,000
East Gharraf Drainage Pump Station	17,500	71,000	N/A	N/A	N/A

Source: documents provided by JICA and MOWR

Note: Badra Jassan Irrigation Pump Stations No. 2 and No. 3 are not included in the table because they are connected to No. 1 and No. 4A to perform pump-up operation (to assist No. 1 and No. 4A).

2. Annual total volume of pumped water for each pump (operation indicator)

The baselines and targets for the total annual volume of water pumped by each pump at the pump stations under the project were specified in the IP, as shown in the table below. As for the actual figures, according to MOWR, no operational records for the pumps exist, and thus the data in the table below was calculated based on the average operating hours of the pumps in recent years. The actual figures for irrigation pump stations have reached more than 70% against the target, while the actual figures for the drainage pump stations have fallen far below the target, ranging from 27% to 60% against the target. According to MOWR, this is due to the fact that (1) flood risk (and associated drainage demand) was considered when the targets were set at the time of the appraisal, but the actual occurrence of flooding was limited, and (2) the drainage volume has been reduced due to severe water shortages resulting from reduced inflows into Iraq (especially due to the fact that cultivation is limited in the summer months when water shortages are severe and, as a result, the operating hours of drainage pumps are shorter in the summer). The operating hours calculated based on the actual figures in the table below and the capacities of pumps procured under the project are 11 to 23 hours/day on average for the irrigation pumps but three to five hours/day on average for the drainage pumps, from which we can infer that the operating hours of the drainage pumps at the time of the ex-post evaluation are low.

Table 7: Annual Total Volume of Pumped Water for Each Pump

(Unit: 1,000 m³/year/pump)

Pump Station	Baseline	Target	Actual	
	2008		2021	
		After completion	3 years after completion	
Badra Jassan Irrigation Pump Station No. 1	40,824	58,320	88,128	151%
Badra Jassan Irrigation Pump Station No. 2	40,824	58,320	44,064	76%
Badra Jassan Irrigation Pump Station No. 3	40,824	58,320	44,064	76%
Badra Jassan Irrigation Pump Station No. 4A	36,742	52,488	38,916	74%
Shakha Drainage Pump Station No. 8	11,030	19,440	9,720	50%
Shakha Drainage Pump Station No. 10	9,072	16,200	4,350	27%
Shakha Drainage Pump Station No. 13	15,967	28,512	14,250	50%
East Gharraf Drainage Pump Station	0	67,392	40,355	60%

Source: documents provided by JICA and MOWR

Note: The right most column shows the percentage of target achievement.

3. Production volume of major crops (effect indicator)

The baselines and targets for the production volume of wheat and barley in the project's benefit areas were specified in the IP, as shown in the table below. Regarding the actual figures, with the exception of Badra Jassan Irrigation Pump Station No. 4A, data on cultivated areas or unit yield was not available for the benefit areas, and thus the production volume data provided cannot be verified. The actual wheat production volume is above the target at Badra Jassan Irrigation Pump Station No. 1 and Shakha Drainage Pump Station areas, while the actual barley production volume is significantly below the target in all areas. According to MOWR, this is due to the fact that: in recent years, rainfall has been very low in some years, making the already mentioned water shortages even worse; due to water shortages, MOA determines the area to be planted and the cropping intensity by crop for each year, and farming is conducted accordingly; and farmers' agricultural techniques are often poor and fail to reach the cropping intensity determined by MOA. Moreover, according to a report published by the U.S. Department of Agriculture (USDA), in addition to severe water shortages, especially in 2021, MOA's subsidy system for farmers has been changed. Previously, farmers who followed MOA's annual agricultural plan were allocated certified seeds at a 70% subsidy rate. However, the subsidy rate was reduced to 30%. The amount of subsidized fertilizer was also reduced from 120 kg/ha to 20 kg/ha.¹⁵ This could be the reason for the lower production volumes of both wheat and barley in 2021 as shown in the table below.

¹⁵ "Grain and Feed Annual: Extreme Water Shortages and Policy Changes Impact Iraq Grain Production" (USDA, April 15, 2022)

Table 8: Production Volume and Unit Yield of Major Crops

Pump Station	Baseline	Target	Actual		
	2008		2019	2020	2021
		After completion	1 year after completion	2 years after completion	3 years after completion
Production Volume of Wheat (Unit: ton/year)					
Badra Jassan Irrigation Pump Station No. 1	15	10,000	14,000 (140%)	12,000 (120%)	11,000 (110%)
Badra Jassan Irrigation Pump Station No. 4A	15	30,000	16,866 (56%)	16,589 (55%)	7,796 (26%)
Shakha Drainage Pump Station No. 8	46,400	97,620	120,000 (123%)	100,000 (102%)	90,000 (92%)
Shakha Drainage Pump Station No. 10					
Shakha Drainage Pump Station No. 13					
East Gharraf Drainage Pump Station	8,400	42,000	N/A	N/A	N/A
Unit Yield of Wheat (Unit: ton/ha)					
Badra Jassan Irrigation Pump Station No. 4A	0.0012	4.0	3.7 (93%)	2.74 (69%)	N/A
Production Volume of Barley (Unit: ton/year)					
Badra Jassan Irrigation Pump Station No. 1	15	15,000	2,000 (13%)	2,000 (13%)	1,500 (10%)
Badra Jassan Irrigation Pump Station No. 4A	15	20,000	4,620 (23%)	1,652 (8%)	N/A
Shakha Drainage Pump Station No. 8	29,600	65,080	9,000 (14%)	8,000 (12%)	9,000 (14%)
Shakha Drainage Pump Station No. 10					
Shakha Drainage Pump Station No.13					
East Gharraf Drainage Pump Station	4,200	28,000	N/A	N/A	N/A
Unit Yield of Barley (Unit: ton/ha)					
Badra Jassan Irrigation Pump Station No. 4A	0.0012	4.0	2.21 (55%)	1.43 (36%)	N/A

Source: documents provided by JICA and MOWR

Note: Badra Jassan Irrigation Pump Stations No. 2 and No. 3 are not included in the table because they are connected to No. 1 and No. 4A to perform pump-up operation (to assist No. 1 and No. 4A).

Percentages in parentheses indicate the percentage of target achievement.

3.3.1.2 Qualitative Effects (Other Effects)

The exact locations of the equipment and machinery for the maintenance of irrigation drainage canals procured under the project are unknown at the time of the ex-post evaluation. According to MOWR, while most of the equipment and machinery for the maintenance of irrigation drainage canals owned by the Ministry are in operation, some of them were procured through the project and some were procured through other donors' funds or MOWR's own funds, and it is difficult to identify which ones were procured through the project. However, most of the maintenance equipment and machinery owned by the Ministry have been used for cleaning and maintaining irrigation drainage canals, and the maintenance status of the canals has improved considerably compared to the time of the appraisal. MOWR explained that the water conveyance efficiency in the project benefit areas had been about 45% before the project was implemented, but after the completion of the project, the efficiency improved to about 58%. In addition, as mentioned above, effects were observed that the proper dredging of canals through the use of the equipment procured under the project by MOWR contributed to the proper distribution of water to each WUA district covered by the "Project for Spreading Water Users Associations for the Efficient Use of Irrigation Water" (2012-2015).

Soil salinity in the project benefit areas has been improved to some extent, according to MOWR. For reference, according to the data provided by the Ministry on the concentration of total dissolved solids (TDS) in the drainage canal where East Gharraf Drainage Pump Station is located, the average TDS concentration from January to December 2018 was 14,141 ppm, while the average TDS concentration from January to December 2021 was 13,108 ppm, showing a decrease of about 7%. However, as mentioned above, since the actual volume of pumped water at the drainage pump stations covered by the project is much lower than the target, the contribution of the project to the improvement of salinity may be somewhat limited, although it cannot be judged solely on the basis of the amount of water discharged by the pumps.

3.3.2 Impacts

3.3.2.1 Intended Impacts

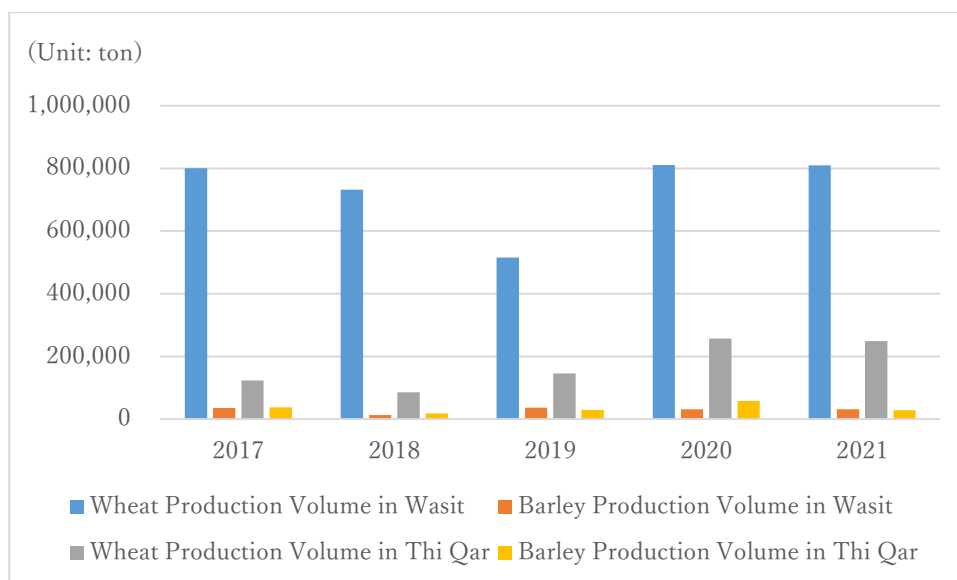
(1) Quantitative Impacts

The intended impact of this project was to "contribute to Iraq's economic and social recovery through the revival of its irrigated agriculture." We attempted to verify this impact by obtaining data on gross farm income per household in the project's benefit areas, but the only data that were available clearly lacked reliability. Thus, publicly available statistical data were used for verification.

1. Production volume of major crops in Wasit and Thi Qar governorates

According to data published by Iraq's Central Statistical Organization (CSO), the production

volumes of wheat and barley in recent years in Wasit and Thi Qar governorates, where the project's benefit areas are located, are shown in the figure below. Wheat production in both governorates has been increasing since 2019. Although this trend differs from the trend in the project benefit areas shown in Table 8, the reason is unclear. The data on cultivated areas by crop in the project's benefit areas was not available. However, it was assumed that the area planted with wheat is the largest in the project's benefit areas in Wasit governorate, given that wheat is the most produced major crop in Iraq (especially in the project's benefit areas) and wheat production is flourishing in Wasit governorate. Comparing the average wheat cultivated area in Wasit governorate in 2017-2021 (238,079 ha), taken from the CSO data, and the total actual area benefited from the project in Wasit governorate (59,579 ha),¹⁶ the area benefited from the project is 25% of wheat cultivated area in Wasit governorate. While it is not an accurate comparison, it can be inferred that the project has contributed to a certain extent to the increase in wheat production in Wasit governorate in recent years. In addition, according to the USDA report mentioned above, Iraq suffered from severe water shortages as well as high temperatures and droughts in 2021/2022, resulting in a significant decrease in wheat production in rainfed agricultural areas in northern Iraq, with the highest share of wheat production in the country (19.1%) reported in Wasit governorate. Thus, it is considered that this project is also contributing to a certain extent to ensuring domestic food self-sufficiency.



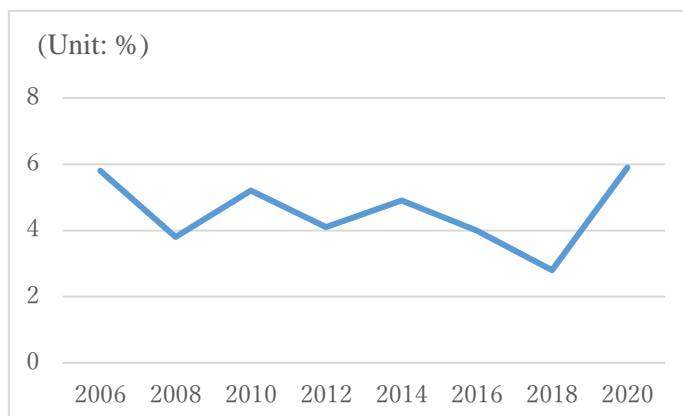
Source: CSO (URL: <https://cosit.gov.iq/ar/agri-stat/veg-prod>) (accessed on September 15, 2022)

Figure 3: Production Volume of Wheat and Barley in Wasit and Thi Qar Governorates

¹⁶ Only for Badra Jassan Irrigation Pump Station No. 4A, the average cultivated area with wheat from 2017 to 2021 is known (8,304 ha), so this was used.

2. Agricultural sector as a percentage of Iraq's Gross Domestic Product (GDP)

Data on the gross regional domestic product (GRDP) of Wasit and Thi Qar governorates and the share of agriculture in this GRDP were not available, and thus the World Development Indicators data shown on the right were used instead. Figure 4 shows that the share of the agriculture (including forestry and fishing) sector in Iraq's GDP was 5.8% at the time of the appraisal (2006), then dropped to the 2% level, and recovered to 5.9% in 2020. While the decline from 2014 to 2018 appears to have been affected by the deteriorating



Source: World Bank (URL: <https://data.worldbank.org/indicator/NV.AGR.TOTL.ZS>)
(Accessed on February 25, 2022)

Figure 4: Agricultural sector as a percentage of Iraq's GDP

security situation caused by ISIL, it has recovered in the past few years to the same level as at the time of the appraisal. As mentioned above, although the target achievement rate of the production volume by major crop in the project benefit areas has been limited, some areas have exceeded the target, and the project seems to have contributed to a certain extent to the growth of this particular agricultural sector through the revitalization of irrigation drainage canals and irrigated farmlands.

(2) Qualitative Impacts

According to MOWR, during the project implementation, local residents were employed as workers and guards for the installation of pumps and associated electrical work, resulting in a certain amount of job creation in the areas covered by the project. In addition, there were some areas where the project resulted in an increase in crop production (in fact, wheat production in some areas significantly exceeded the target as shown in “Table 8: Production Volume and Unit Yield of Major Crops”), and it is reasonable to assume that the project has had, although to a limited extent, a certain positive impact on domestic job creation and the revitalization of the Iraqi economy.

3.3.2.2 Other Positive and Negative Impacts

1) Impacts on the Natural Environment

This project was classified as Category FI under the “Japan Bank for International Cooperation Guidelines for Confirmation of Environmental and Social Considerations” (established in April 2002) because subprojects could not be identified prior to JICA's loan

approval and there were concerns that such subprojects might have environmental impacts. Since the project is mainly for the provision of irrigation and drainage equipment and machinery, no significant negative environmental impacts were foreseen from the subprojects, and the project was not required to conduct an environmental impact assessment (EIA). According to the consultants for the project, they prepared the guideline for water quality monitoring during the project, while other environmental monitoring works were conducted by MOWR itself. MOWR explained that the project was implemented in accordance with internationally accepted and appropriate environmental management regulations, and that no significant negative impacts on the natural environment were identified during the implementation of the project.

2) Resettlement and Land Acquisition

At the time of the project appraisal, it was assumed that the project would primarily provide irrigation and drainage equipment and machinery and that no resettlement would occur. According to MOWR, no resettlement or land acquisition occurred under the project.

3) Gender Equality, Marginalized People, Social Systems and Norms, Human Well-being and Human Rights and Other Impacts

As mentioned above, although there was no particular discussion at the time of the appraisal regarding considerations for and fairness to marginalized people, according to MOWR and the consultants involved in the project, the project did not disadvantage any marginalized people including the poor.

Although there is a special circumstance that MOA determines the area for agricultural use according to the amount of available water in light of the severe water shortages faced in Iraq caused by declining river inflows, the results of the validation of the quantitative and qualitative effects mentioned above do not seem to provide enough grounds to claim that the direct outcome, “revitalization of the existing irrigation drainage canals and irrigated farmland” has been achieved. In addition, although it is presumed that the project has contributed to some extent to the recent increase in the production volume of major crops in the target governorates and the increase in the share of the agricultural sector in Iraq’s GDP, available data did not clearly confirm the extent of the contribution. This project has achieved its objectives only to a certain extent. Therefore, effectiveness and impacts of the project are moderately low.¹⁷

¹⁷ Examination of the effectiveness (direct outcome) found that the actual areas benefited from the project were below the baselines, the actual volume of pumped water was 27%-151% (71% on average) against the targets, and the actual production volume of wheat and barley was 8%-140% (62% on average in 2019, 52% on average in 2020, and 50% on average in 2021) against the targets. In light of these facts, and by taking into account positive effects observed to a certain extent in terms of qualitative effects and impacts, the results of our examination satisfy the evaluation criteria for JICA’s ex-post evaluation, “moderately low (guideline: target achievement rate of 50% to 70%).” Therefore, we determined that it is appropriate to evaluate the effectiveness and impacts of the project as “moderately low.” In addition, in JICA’s ex-post evaluation, while natural disasters, war, and temporary evacuation

3.4 Sustainability (Rating: ②)

3.4.1 Policy and System

As mentioned in “3.1.1 Relevance,” at the time of the ex-post evaluation, the importance of agriculture in the Iraqi economy and the need for the development and maintenance of irrigation and drainage pumps and canals were mentioned in *the National Development Plan* and strategic documents related to water resources. Therefore, it is reasonable to say that policies and systems are in place to ensure the sustainability of the project effects.

3.4.2 Institutional/Organizational Aspect

At the time of the project appraisal, MOWR’s regional offices in each governorate were, under the management and supervision of the headquarter of MOWR, to be in charge of the O&M of irrigation and drainage pumps and equipment and machinery for the maintenance of irrigation drainage canals to be procured under the project. At the time of the ex-post evaluation, O&M are conducted under the same system. The Kut regional office in Wasit governorate is in charge of the O&M of Badra Jassan Irrigation Pump Stations No. 1, 2, 3, 4A and Shakha Drainage Pump Stations No. 8, 10, 13, while the Nassiriya regional office in Thi Qar governorate is in charge of the O&M of East Gharraf Drainage Pump Station. The number of maintenance staff at each pump station at the time of the ex-post evaluation (as of 2022) is as follows.

Table 9: Number of Maintenance Staff at the Pump Stations Covered by the Project

(Unit: persons)

Pump Station	Number of Maintenance Staff
Badra Jassan Irrigation Pump Stations No. 1, 2, 3, 4A	32
Shakha Drainage Pump Stations No. 8, 10, 13	15
East Gharraf Drainage Pump Station	22

Source: documents provided by MOWR

It is assumed that the equipment and machinery for the maintenance of irrigation drainage canals procured under the project are operated and maintained by the State Commission for Operation of Irrigation & Drainage Projects, the State Commission for Maintaining Irrigation & Drainage Projects, the Directorate of Executing River Dredging Works, etc. of MOWR (although their exact locations are unknown as previously mentioned). The State Commission for Operation of Irrigation & Drainage Projects is mainly in charge of budget planning, bidding and contract

due to deterioration of security situation etc. are considered as external factors, the following factors are not considered as external factors: (1) any indispensable factor or precondition for achieving the project objectives; (2) any event that has been occurring continuously or frequently in the project area; or (3) any risk that was identified at the time of planning/appraisal. The water shortage and deterioration of the security situation observed in this project fall into one or more of these categories, and therefore, we decided not to treat them as external factors.

procedures, implementation supervision, and the O&M of pump stations for irrigation and drainage projects; the State Commission for Maintaining Irrigation & Drainage Projects is mainly in charge of the maintenance of irrigation and drainage networks; and the Directorate of Executing River Dredging Works is mainly in charge of dredging rivers, dam reservoirs, and other water bodies. The number of staff in the above State Commissions and Directorate in 15 governorates at the time of the ex-post evaluation (as of 2022) is as follows.

Table 10: Number of Staff in the State Commission for Operation of Irrigation & Drainage Projects, the State Commission for Maintaining Irrigation & Drainage Projects, and the Directorate of Executing River Dredging Works

(Unit: persons)

Governorate	State Commission for Operation of Irrigation & Drainage Projects	State Commission for Maintaining Irrigation & Drainage Projects	Directorate of Executing River Dredging Works
Kirkuk	107	30	3
Salah Al-Din	94	12	11
Diyala	201	45	6
Wasit	169	89	12
Maysan	85	21	6
Thi Qar	169	83	21
Basrah	82	45	20
Muthanna	39	28	13
Al-Qadisiyah	140	100	17
Najaf	137	51	11
Babil	206	118	28
Karbala	81	56	12
Baghdad	465	479	234
Anbar	107	39	14
Mosul	221	28	16

Source: documents provided by MOWR

Note: Figures include both engineers and support staff members, who are roughly equal in number, as well as several administrative staff members.

MOWR explained that, while an increase in the number of electrical engineers and technicians would improve the efficiency of operations, the number of staff is mostly sufficient to maintain pump stations and equipment and machinery for the maintenance of irrigation drainage canals. On the other hand, at the time of the project appraisal, JICA and the Iraqi side agreed that all the maintenance equipment and machinery procured under the project would be placed under the responsibility of MOWR headquarters and registered in the asset management records, and that the Ministry would update the asset management records upon receiving periodic progress reports on the status of the equipment and machinery from the regional offices to which the equipment and machinery were distributed. However, according to MOWR, the asset management records were prepared when the PCR for this project was drafted (2019), but they have not been updated

since then. MOWR has reported that although it believes that the assigned locations for some of the equipment and machinery have been changed, it would be difficult to trace and manage all locations due to the number of person-hours required for these tasks and the impact this may have on other works, as such tasks would involve requesting each regional office through an official letter to perform the check and collecting and compiling their responses. As mentioned above, most of the maintenance equipment and machinery owned by the Ministry are being used for cleaning and maintaining irrigation drainage canals; however, concerns remain from the perspective of ensuring the sustainability of the project effects.

3.4.3 Technical Aspect

At the time of the project appraisal, a lesson was learned from the ex-post evaluation of similar projects in the past that the establishment of an appropriate O&M system is important for smooth O&M of the facilities after the start of operation. Thus, it was agreed that this project would pay an adequate amount of attention to the establishment of an O&M system by including training for MOWR in the project components. The project actually provided O&M training (about two weeks per lot) and manuals for MOWR staff in each procurement lot. According to MOWR, the training participants have provided guidance to and shared information with other staff members, and MOWR also receives technical assistance from private contractors as needed. It was also confirmed that the O&M manuals provided in each procurement lot have been distributed to and used by the regional offices in charge of the pump stations covered by the project. Moreover, MOWR has a training center at its headquarters, where its staff receives various training programs annually on the design of irrigation systems, how to maintain pumps and other equipment, how to use various software, etc. On-demand training is also provided based on training requests from various departments. Although data on the number of training participants was not available, a system to ensure O&M techniques is in place, and there are generally no technical problems.

3.4.4 Financial Aspect

The amount of the national budget allocated to MOWR at the times of the project appraisal and the ex-post evaluation is as follows. At the time of the ex-post evaluation, the amount allocated to the Ministry was significantly higher than at the time of the appraisal.¹⁸

¹⁸ According to MOWR, the increase in 2019 is to cover expenditures for major projects undertaken in 2017 and 2018.

Table 11: Amount of the National Budget Allocated to MOWR

(Unit: million dinars)

	2006	2018	2019	2021
Allocated Amount	300,000	406,109	911,250	547,722
Of which, maintenance cost	N/A	31,586	87,310	N/A

Source: documents provided by JICA, website of the Ministry of Finance, Iraq
(URL: <http://mof.gov.iq/obs/en/Pages/about.aspx>) (accessed on August 23, 2022)

The actual maintenance costs for each pump station at the Kut regional office and the Nassiriya regional office are as follows.

Table 12: Actual Maintenance Costs for Pump Stations

(Unit: 1,000 dinars)

Pump Station	2019	2020	2021
Badra Jassan Irrigation Pump Stations No. 1, 2, 3, 4A	35,000/year* ¹		
Shakha Drainage Pump Stations No. 8, 10, 13	5,000/year* ²		
East Gharraf Drainage Pump Station	40,300	22,300	4,650

Source: documents provided by MOWR

Note: *1: Although yearly disbursements are unknown, the figure was calculated by dividing the total amount of disbursements between 2016 and 2021 reported, which was 212 million dinars, by the number of years. *2: The figure was calculated by dividing the total amount of disbursements reported between 2016 and 2021 reported, which was 30 million dinars, by the number of years.

The maintenance costs for the pump equipment procured under the project are secured annually as shown in the table above. According to MOWR, the amount of expenditure varies depending on the details of maintenance in a given year, but maintenance costs are kept low thanks to the higher quality of the pumps compared to previous pumps, and the Ministry has secured the necessary budget for the O&M of the equipment and machinery. As described below, two of the five pumps procured under the project malfunctioned at East Gharraf Drainage Pump Station around February 2021, and the budget for repairs was finally approved at the time of the ex-post evaluation. It appears that although it takes time to secure a budget when repairs become necessary, MOWR has been able to obtain necessary budgets.

3.4.5 Environmental and Social Aspect

As mentioned above, no negative impacts on the natural or social environment were observed, and no sustainability risks from an environmental and social perspective were identified.

3.4.6 Preventative Measures to Risks

The project was implemented in Iraq, where the security situation was unstable. According to MOWR, the project was implemented in accordance with the safety regulations of each

governorate where the project site was located, and the Ministry's regional offices provided support to ensure the safety of contractors and consultants. In addition, two fuel tankers, one water tanker, one generator (250 kVA), one wheel loader, one grader, one bulldozer, and five submersible pumps were stolen or robbed by ISIL. MOWR explained that it has already procured new equipment through World Bank assistance and its own funds. Therefore, it is reasonable to say that appropriate measures have been taken to address risks.

3.4.7 Status of Operation and Maintenance

At the pump stations covered by the project, daily maintenance tasks are conducted such as visual inspection of pump equipment, etc.; inspection of control panel (current and voltage), lubricating oil system, and cooling system; vibration check; and fixing nuts and bolts as necessary. In addition, once a year (between August and October), each pump is inspected in detail and consumable parts are replaced. At Badra Jassan Irrigation Pump Station No. 1, which is located near the Tigris River and is prone to debris inflow from the river into the pump station, it was necessary to replace the pump impellers; they have already been replaced with spare parts procured under the project. At East Gharraf Drainage Pump Station, two of the total of five pumps procured under the project have been out of order since about February 2021, and another one has been out of order since around February 2022, with only two pumps in operation at the time of the ex-post evaluation. According to MOWR, while the two units that have malfunctioned since 2021 have been out of operation due to a problem with the electromagnetic contactor of the motor and control equipment included as part of the pump set, the repair budget has finally been approved and the pumps will be repaired as soon as spare parts are procured. The remaining one unit has a problem with the transformer coil; however, it was found that the problem was not serious and repairs will be arranged by the State Commission for Operation of Irrigation & Drainage Projects. In addition, while one metric pump, one generator (1,500 kVA), one truck crane, and five wheel excavators were reported to be out of order at the time the PCR was prepared, as mentioned above, the asset management records have not been updated and the locations of the equipment and machinery for the maintenance of irrigation drainage canals procured under the project are unknown at the time of the ex-post evaluation. Thus, the status of these equipment and machinery is also unknown.

Regarding the operation and maintenance of the project, generally no problems have been identified in terms of the policy/system, technical, financial, environmental and social aspects, and preventive measures to risks. However, some issues have been observed in the institutional/organizational aspect of MOWR and the current status of operation and maintenance, as the locations of the maintenance equipment and machinery procured under the project are unknown. They are not expected to be improved/resolved. Therefore, sustainability of the project

effects is moderately low.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project aimed to revitalize existing irrigation drainage canals and irrigated farmland by providing equipment and machinery used for irrigation and drainage throughout Iraq. The relevance and coherence of the project are high, as the project plan is consistent with the development plans and needs of Iraq and Japan's ODA policy, and collaboration was achieved with a technical cooperation project of JICA. However, the area benefited from the project has not increased since the time of the project appraisal, and the total annual volume of water pumped of the drainage pumps installed in the project is significantly below the target volume. Although the improvement in the maintenance status of existing irrigation drainage canals and water conveyance efficiency was qualitatively confirmed, the achievement of the production target by major crops varied widely by region and crop, and the effect of the project on the revitalization of irrigated farmland appears to be limited. Regarding the expected impact of the project, i.e., contribution to Iraq's economic and social recovery through the revival of its irrigated agriculture, although it is presumed that the project has contributed to a certain extent, the degree of contribution could not be clearly confirmed. Therefore, the effectiveness and impacts of the project are moderately low. The efficiency of the project is moderately low, because the project period significantly exceeded the plan. Sustainability of the project effects is moderately low, because there are some problems with institutional/organizational aspects of O&M and the maintenance status and for low prospects for improvement and resolution.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

Of the total of five drainage pumps procured under the project at East Gharraf Drainage Pump Station, the three pumps that were out of order at the time of the ex-post evaluation should be repaired as soon as possible.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

(1) Necessity of conducting proper monitoring

As mentioned above, the exact locations of the equipment and machinery for the maintenance of irrigation drainage canals procured under the project are unknown at the time of the ex-post

evaluation. At the time of the project appraisal, JICA and the Iraqi side agreed that all the maintenance equipment and machinery procured under the project would be placed under the responsibility of MOWR headquarters and registered in the asset management records, and that the Ministry would update the asset management records upon receiving periodic progress reports on the status of the equipment and machinery from the regional offices to which the equipment and machinery were distributed. An equipment list and a deployment map were prepared, and it was agreed between the JICA office and MOWR that these would be updated and shared on a regular basis (every six months), with the formatting having been completed. However, they have not been updated by MOWR. In future projects, with respect to important matters agreed upon, the status of implementation should be regularly checked and monitored through the JICA office.

(2) Measures and points to keep in mind for implementing projects in conflict-affected situations and as first ODA loan projects

- As mentioned above, the implementation of this project was suspended for a total of ten months due to the deteriorating security situation, and the bidding and contract procedures were significantly delayed because the Iraqi side was unfamiliar with the procedures as this was its very first ODA loan project. Therefore, when implementing a project under similar circumstances, the project period should be set with sufficient time to spare.
- In this project, since the consultants could not be stationed at the site due to the deteriorating security situation, the executing agency and the consultants held regular consultations in a third country (Jordan), and the JICA Iraq Office participated in these consultations as much as possible to facilitate the project through three-way consultations. In addition, the JICA Iraq Office commissioned the UNDP Iraq Office to provide monitoring support during project implementation for all the projects implemented by JICA in Iraq to receive assistance in surveying and reporting the status of sites that JICA could not visit due to security reasons and in coordination between the Iraqi side and JICA. Furthermore, for all projects, a Monitoring Committee was held once a quarter, where the Iraqi Prime Minister's Advisory Commission (PMAC), executing agencies, the Japanese Embassy, JICA, and others met to report on the progress of each project. We believe that these efforts have been instrumental in avoiding further delays in the implementation of this project, which was the first ODA loan project to be implemented in a conflict-affected situation, and can serve as a useful reference when implementing projects under similar circumstances.

5. Non-Score Criteria

5.1. Performance

5.1.1 Objective Perspective

According to MOWR, the fact that JICA, as a donor, conducted a detailed study and established

an appropriate supervision system in Iraq, where the ODA loan project was implemented for the first time, helped solve problems associated with bidding and contract procedures encountered by the executing agency during the implementation of the project and avoid further delays in the project.

5.2. Additionality

Since 2009, the UNDP Iraq Office has entered into a monitoring contract with the JICA Iraq Office to monitor all JICA projects from a neutral ground as a third-party organization. A staff member was assigned to each project to report on the site situation, to coordinate between the Iraqi government and JICA, to provide assistance to the Iraqi government on its internal procedural matters, and to provide training on capacity gaps identified through the monitoring. Examples of training include a series of procedures for letters of credit (L/C) (from opening to closing, considerations for exchange rates, how to handle problems, etc.). The monitoring, follow-up, and consultation by UNDP contributed to the smooth implementation of the project, and the project period might have been further extended without such assistance. This was a value-adding initiative in Iraq, where it was difficult to implement a project for security concerns.

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
1. Project Outputs Renewal of irrigation and drainage pumps, procurement of the equipment and machinery for the maintenance of irrigation drainage canals Consulting services	Irrigation pumps: 8 sets Drainage pumps: 17 sets Metric pumps: 20 sets Equipment and machinery for the maintenance of irrigation drainage canals: 163 Generators for pumps: 60 Support for IP preparation, tendering support, construction management etc. 157 P/M in total	Irrigation pumps: as planned Drainage pumps: 19 sets Metric pumps: as planned Equipment and machinery for the maintenance of irrigation drainage canals: 217 Generators for pumps: 45 Tendering support, construction management etc. 269 P/M in total
2. Project Period	January 2008 – June 2012 (54 months)	January 2008 – December 2017 (120 months)
3. Project Cost Amount Paid in Foreign Currency Amount Paid in Local Currency Total ODA Loan Portion Exchange Rate	 9,430 million yen 3,255 million yen (40,535 million IQD) 12,685 million yen 9,514 million yen 1 IQD = 0.0803 yen (As of January 2006)	 9,376 million yen 13 million yen (177 million IQD) 9,389 million yen 9,376 million yen 1 IQD = 0.0817 yen (Average between 2010 and 2015)
4. Final Disbursement	July 2018	