

**Ex-Post Project Evaluation 2022
Package II-1 (Viet Nam, Iraq)
Evaluation Reports**

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JAPAN INTERNATIONAL COOPERATION AGENCY

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Socialist Republic of Viet Nam

FY2022 Ex-Post Evaluation Report of
Japanese ODA Loan

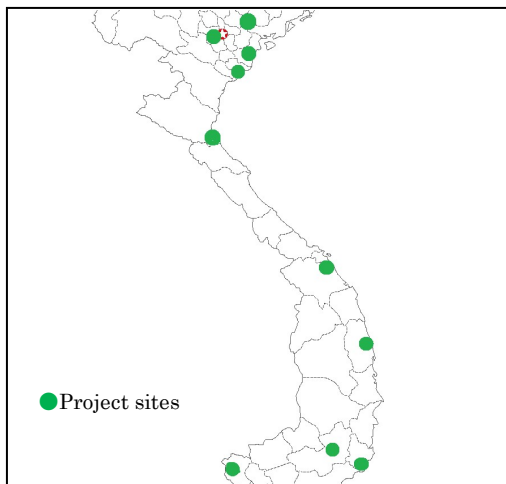
“Regional and Provincial Hospital Development Project (II)”

External Evaluator: Nomoto, Ayako, International Development Center of Japan Inc.

0. Summary

This project was implemented to improve the quality of the medical service system in 10 provinces and cities in Vietnam by strengthening the overall capacity of provincial hospitals through the provision of medical equipment and the development of human resources, thereby contributing to improving people’s health. The project is consistent with Vietnam’s development plan and needs at both the times of appraisal and ex-post evaluation, and its relevance can be confirmed. Although no specific collaborations or outcomes are planned or implemented with other projects of the Japan International Cooperation Agency (JICA) and development partners, the project is consistent with Japan’s ODA policy for Vietnam. Therefore, the relevance and coherence are high. The project produced outputs in line with the revised plan, and although the project period slightly exceeded the plan, the project cost was within the plan, and therefore, the efficiency is high. Among the expected effects, the “annual number of surgical operations,” “annual number of inpatients,” and the “number of trainees from lower-level hospitals who attended training” achieved their target values in the target year, and the “number of patients referred to upper-level hospitals” also achieved its target value in the following year. In addition, “average length of hospital stay” and “hospital infection rate” as additional indicators also showed improvement, and “utilization of equipment” was favorable. As for the impact, the project is considered to have contributed to improving residents’ health by improving the “hospital mortality rate” and responding to COVID-19. Thus, the effectiveness and impacts are high. Although there are some minor problems in the operation and maintenance of the project equipment in terms of institutional/organizational and financial aspects as well as operation and maintenance status, the prospects for improvement and resolution are high. Therefore, the sustainability of the project’s effects is high. In light of the above, the project is evaluated to be highly satisfactory.

1. Project Description



Project Locations (source: provided by JICA)



Image 1: CT scanner
(source: taken by the evaluator)

1.1 Background

Various health indicators were improving in Vietnam; however, the improvement was witnessed mainly in urban areas, and disparities between urban and rural areas remained an issue. In addition, the structure of diseases had been changing, coupled with improvements in the living environment due to economic growth and other factors, and there was a growing need for advanced diagnostic and treatment services, especially for non-communicable diseases (lifestyle-related diseases such as cancers, heart disease, hypertension, and diabetes), which had been on the increase significantly.

The regional medical system in Vietnam (a coordinated network of medical institutions) comprises three layers: the 1st layer (commune and county level), the 2nd layer (provincial level), and the 3rd layer (central level). Upper-level hospitals are responsible not only for accepting patients transferred from lower-level hospitals located in their coverage areas but also for providing instruction and assistance to the lower-level hospitals. In reality, however, many provincial hospitals lacked both in terms of quality and quantity in terms of facilities, equipment, and medical personnel and could not meet local medical needs. As a result, major national hospitals in urban areas were experiencing excessive congestion, with the occupancy rate approaching 200%, and this was causing severe dysfunction in the overall medical system, in addition to a decline in the quality of medical services at each hospital.

1.2 Project Outline

The objective of this project is to improve the quality of the medical service system in the target provinces by strengthening the overall capacity of provincial hospitals through the provision of medical equipment and the development of human resources, thereby contributing to improving people's health.

Loan Approved Amount/ Disbursed Amount	8,693 million yen / 8,558million yen
Exchange of Notes Date/ Loan Agreement Signing Date	March 2012 / March 2012
Terms and Conditions	Interest Rate 0.2% (0.01% for the consulting services) Repayment Period 40 years (Grace Period 10 years) Conditions for Procurement Tied (Special Terms for Economic Partnership (STEP))
Borrower / Executing Agency	The Government of the Socialist Republic of Viet Nam / Ministry of Health (MOH)
Project Completion	July 2017
Target Areas	Bac Giang Province, Hanoi, Thai Binh Province, Nam Dinh Province, Nghe An Province, Da Nang, Binh Dinh Province, Lam Dong Province, Tay Ninh Province, and Ninh Thuan Province
Main Contractors (Over 1 billion yen)	Mitsubishi Corporation (Japan), Miyano Medical Instruments Co., Ltd. (Japan)
Main Consultants (Over 100 million yen)	International Total Engineering Corporation (Japan) / Mediconsult Joint Venture Company Ltd. (Vietnam, JV)
Related Studies (Feasibility Studies, etc.)	“Special Assistance for Project Formation for Provincial and Regional Hospital Development Project (Phase II) in the Socialist Republic of Viet Nam” (2011)

2. Outline of the Evaluation Study

2.1 External Evaluator

Nomoto, Ayako, International Development Center of Japan Inc.

2.2 Duration of Evaluation Study

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

Duration of the Study: October 2022 – January 2024

Duration of the Field Study: February 12, 2023 – March 7, 2023, June 18, 2023 – June 22, 2023

3. Results of the Evaluation (Overall Rating: A¹)

3.1 Relevance/Coherence (Rating: ③²)

3.1.1. Relevance (Rating: ③)

3.1.1.1 Consistency with the Development Plan of Vietnam

At both the times of the appraisal and the ex-post evaluation, strengthening medical and health services was included in the development plan. Therefore, the project is highly consistent with the development plan.

At the time of the appraisal, the *10-Year Socio-Economic Development Strategy (2010-2020)* identified improving healthcare services as one of the priority issues. The *Five-Year Socio-Economic Development Plan (2011-2015)* set numerical targets, such as extending life expectancy (74 years or more by 2015), maternal mortality rate (60 cases per 100,000 live births), and infant mortality rate (12 cases or less for infants and 20 cases or less for children under five years old per 1,000 live births). The Plan articulated that achieving these targets requires enhancing medical facilities and equipment as well as strengthening human resources. In addition, the *Health and Medical Care Master Plan (2010-2020)*, approved in 2006, stated that to achieve the above plans and strategies, it is essential to strengthen medical institutions offering diagnosis, treatment, and rehabilitation and to consolidate and complete the medical network at the local level. Specific measures included the construction of new medical facilities, financial reinforcement for health and medical care, and the development of human resources.

At the time of the ex-post evaluation, the *Five-Year Plan for Socio-Economic Development (2021-2025)* aimed for strong and comprehensive innovation and improvement of the quality of medical and health services for people. The plan included promoting preventive medicine, improving health, preventing and controlling infectious and non-communicable diseases, developing hospital networks, researching and producing medicines for disease treatment and medical equipment, and implementing a roadmap for universal health insurance. In addition, in the *National Action Plan for the implementation of the 2030 sustainable development agenda* (formulated in 2017), under Goal 3: “Ensure a healthy life and enhance welfare for all citizens of all age groups,” it is stated that “By 2030, reduce by 20-25% the death rate before 70 years of age as a result of non-communicable diseases, through prevention and treatment measures as well as the promotion of mental health and well-being.” This project, which aims to improve medical services by upgrading medical equipment, mainly for non-communicable diseases, aligns with this goal.

3.1.1.2 Consistency with the Development Needs of Vietnam

The need for medical equipment for this project was high both at the time of the appraisal and

¹ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

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

at the time of the ex-post evaluation, given the disparities in medical care between rural and urban areas and the structure of diseases.

At the time of the appraisal, Vietnam had improved various health indicators; however, the improvement was mainly in urban areas, and the disparities between urban and rural areas in terms of maternal mortality rate, under-five mortality rate, number of beds, and number of doctors per 10,000 population were still an issue. In addition, as shown in Table 1, non-communicable diseases were increasing in the disease structure, and there was a growing need for advanced diagnostic and treatment services. Furthermore, as shown in Table 3, the occupancy rate of major national hospitals in urban areas at the tertiary level was close to 200%, indicating excessive congestion.

Although data showing regional disparities in health indicators were not available at the time of the ex-post evaluation, as shown in Table 2, the percentage of inpatient cases in the target hospitals indicates that there is still a high need for the project's equipment, which was procured mainly for non-communicable diseases.

Table 1: Percentage of inpatient cases in public hospitals nationwide at the time of the appraisal (%)

Percentage of cases of inpatients	1986	2008
Communicable diseases	59.2	25.2
Non-communicable diseases	39.0	63.1
Accident, trauma, poisoning	1.8	11.7

Source: MOH

Table 2: Percentage of inpatients cases in the target hospitals at the time of the ex-post evaluation (%)

Percentage of cases of inpatients	2021
Communicable diseases	7.8
Non-communicable diseases	69.8
Accident, trauma, poisoning	22.4

Source: Questionnaires to the target hospitals (Number of respondents = 9)

In addition, the upper-level major national hospitals, Bach Mai Hospital (Hanoi City), Hue Central Hospital (Hue City), and Cho Ray Hospital (Ho Chi Minh City), showed improvement compared to the time of the appraisal; however, they were still crowded at the time of ex-post evaluation, as shown in the table below, indicating that the need to reduce congestion at upper-level hospitals remains high.

Table 3: Congestion at major national hospitals at the times of appraisal and ex-post evaluation

Hospital	2009		2022	
	Number of beds	Occupancy rate (%)	Number of beds	Occupancy rate (%)
Bach Mai Hospital	1,800	177	3,600	150
Hue Central Hospital	1,400	182	3,201	106
Cho Ray Hospital	1,800	193	3,201	107

Source: MOH

3.1.1.3 Appropriateness of the Project Plan and Approach

No problems were found in the project plan and approach.

Regarding lessons learned from similar preceding projects, it was pointed out that increasing support from consultants would promote the smooth implementation of the project and that clarifying the division of responsibilities among agencies by concluding project implementation contracts between the Ministry of Health (hereinafter referred to as “MOH”) at the central level and the Provincial People’s Committees would be essential. In this project, project implementation contracts were signed between MOH and the Provincial People’s Committees to clarify the division of responsibilities among the agencies. In addition, interviews with each target hospital revealed that this was the first time for them to implement an ODA loan project. Many said that it would have been impossible to implement the project without support from consultants and the Central Project Management Unit (hereinafter referred to as “CPMU”) of MOH, including the preparation, implementation, and evaluation of bidding documents, contracts with suppliers, management of counterpart funds, and reporting to authorities in compliance with JICA procurement guidelines and Vietnamese domestic procedures, contracts with suppliers, management of counterpart funds, and reporting to authorities. Thus, the project implementation system was appropriate.

On the other hand, the project’s training component was canceled due to difficulties in procurement in line with the STEP rules and the expected contract format, as described in “3.2.1 Project Outputs.” As a result, additional procurement for the medical equipment was conducted using the unused ODA loan balance of the canceled training component. Although the increased number of procured equipment items led to a high level of effectiveness, there needed to be more consideration of the project component in line with the STEP rules concerning the training component.

3.1.2 Coherence (Rating: ②)

3.1.2.1 Consistency with Japan’s ODA Policy

At the time of the appraisal, this project aligned with Japan’s ODA policy. The *Country Assistance Policy for Viet Nam (July 2009)* set “enhancing social and living conditions and narrowing internal disparities” as one of the four pillars, and the “improving basic social services” positioned the consolidation of medical care facilities and equipment at central and provincial levels as a key issue. In addition, the *Rolling Plan for the Socialist Republic of Viet Nam* aimed to strengthen local healthcare systems by enhancing the capacity of healthcare personnel and improving the facilities and equipment of local medical institutions, centered on the program for quality improvement of healthcare services.

3.1.2.2 Internal Coherence

There are no specific collaborations planned or implemented or outcomes achieved with other JICA projects. However, based on interviews with each target hospital, three hospitals (Lam Dong Provincial General Hospital, Bac Giang Provincial General Hospital, and C Da Nang Central General Hospital) have received training at Cho Ray Hospital, Bach Mai Hospital, and Hue Central Hospital, the three base hospitals where Japan has provided grant aid and technical cooperation. In addition, Binh Dinh Province General Hospital participated in the teacher training course of the technical cooperation project “Project for Strengthening Clinical Training System for New-Graduate Nurses” (2016-2020), which together with this project contributed to improving medical technicians’ skills.

3.1.2.3 External Coherence

There are no specific collaborations planned or implemented or outcomes achieved with other development partners.

Thus, the project is consistent with the development plan of Vietnam and with the development needs (for medical equipment). No problems were found in the project plan and approach. Regarding consistency, although no specific collaborations or outcomes with other JICA projects or development partners were found in terms of internal and external consistency, the project is highly consistent with Japan's ODA policy. Therefore, its relevance and coherence are high.

3.2 Efficiency (Rating: ③)

3.2.1 Project Outputs

The outputs were in line with the plan after the change (cancellation of the training program and procurement of additional equipment using the resulting unused balance of the ODA loan), as shown below. Although there was some additional procurement of medical equipment, the breakdown of the equipment was almost as expected, and the project was implemented as planned, including consulting services.

1) Medical Equipment Procurement

At the time of the appraisal, the ten target hospitals had planned to procure medical operation/consultation equipment (operating tables, endoscopes, laparoscopes, anesthesia equipment, etc.), intensive care unit (ICU) equipment (ventilators, monitors, etc.), diagnostic imaging equipment (CT scanners, X-ray equipment, etc.), laboratory and analysis equipment (blood analyzers, electrophoresis equipment, etc.), sanitation control equipment (sterilization equipment, etc.), and other equipment totaling about 1,486 pieces. After the start of the project, a final confirmation of the equipment list was to be made according to the latest status of each

hospital.

Actually, a total of 2,001 pieces of equipment were procured in the types of equipment that had been anticipated at the time of the appraisal. As described below (“2) Training Programs”), the number of procured equipment increased due to additional procurement by three hospitals (Bac Giang Provincial General Hospital, Thai Binh Provincial Pediatrics Hospital, and Nghe An Obstetrics and Pediatrics Hospital) using unused ODA loan balance from the cancellation of the training programs, in addition to the equipment initially procured. The additional equipment procurement was in line with the project’s original purpose.

Table 4: Number of equipment procured

Hospital	Plan	Actual
Bac Giang Provincial General Hospital	130	97
Son Tay Inter-District General Hospital	91	68
Thai Binh Provincial Pediatrics Hospital	66	88
Nam Dinh Provincial Obstetric Hospital	103	156
Nghe An Provincial Pediatrics Hospital (Currently Nghe An Obstetrics and Pediatrics Hospital)	139	228
C Da Nang Central General Hospital	99	162
Binh Dinh Provincial General Hospital	184	626
Lam Dong Provincial General Hospital	137	167
Tay Ninh Provincial General Hospital	111	193
Ninh Thuan Provincial General Hospital	212	216
Ministry of Health	214	—
Total	1,486	2,001

Source: Documents provided by JICA, MOH, and the target hospitals

2) Training Programs

At the time of the appraisal, training programs (medical care skills, equipment maintenance/management, hospital management, etc.) were planned for the ten target hospitals. However, after the start of the project, it was found that (1) the STEP (Special Terms for Economic Partnership) rules³ require that the main contractors be Japanese companies or institutions; however, the possibility of Japanese companies showing interest in organizing a large number of training courses consisting of training in Vietnam and Japan was low, which would consequently violate to the STEP rules, and (2) the Minutes of Discussion stipulates that the MOH will conclude a contract with the target hospitals jointly; however, since the counterpart budget is allocated directly to the ten hospitals by each province and not to the MOH, it was impossible to conclude the contract as stipulated in the Minutes of Discussion.

³ STEP promotes Japan’s “face-to-face assistance” through technology transfer to partner countries by utilizing Japan’s superior technology and know-how.

3) Consulting Services

As mentioned above, the cancellation of the training programs resulted in changes in the work content; however, the consulting services were generally implemented as planned.

Table 5: Consulting services

Plan	Actual
- Detailed design - Support for equipment procurement, installation, and operation management - Support for coordination and implementation supervision related to training - Technical advice and coordination support for overall project operation - Support for project monitoring and evaluation	- Detailed design - Support for equipment procurement, installation, and operation management - Environmental control and infection control - Support for project operation and monitoring - Support for additional procurement

Source: Documents provided by JICA and the executing agency

3.2.2 Project Inputs

(For details, please refer to the “Comparison of the Original and Actual Scope of the Project” on the last page of the report.)

3.2.2.1 Project Cost

Table 6 shows the planned and actual project costs. The planned project cost was 9,803 million yen (of which the ODA loan covered 8,312 million yen), excluding the canceled training expenses. The actual cost was 8,703 million yen (of which the ODA loan covered 7,780 million yen), excluding the additional equipment procurement (778 million yen for both overall and under the ODA loan), which was within the plan (89% of the plan).

Table 6: Project cost

(Unit: million yen)

	Plan (at the time of Ex-ante evaluation)						Actual					
	Foreign Currency		Local Currency		Total		Foreign Currency		Local Currency		Total	
		ODA Loan		ODA Loan		ODA Loan		ODA Loan		ODA Loan		ODA Loan
Equipment Procurement	7,076	7,076	0	0	7,076	7,076	7,574	7,574	683	683	8,275	8,275
Training	65	65	317	317	381	381	0	0	0	0	0	0
Consulting Services	190	190	73	73	262	262	149	149	65	65	214	214
Price Escalation	349	349	126	126	475	475	0	0	0	0	0	0
Contingency	374	374	22	22	397	397	0	0	0	0	0	0
Interest during Construction	50	50	0	0	50	50	45	45	0	0	45	45
Commitment Charge	52	52	0	0	52	52	42	42	0	0	42	42
Land Acquisition	0	0	0	0	0	0	0	0	0	0	0	0
Admin Cost	0	0	430	0	430	0	0	0	466	0	466	0
Tax	0	0	1,062	0	1,062	0	0	0	457	0	457	0
Total	8,155	8,155	2,029	538	10,184	8,693	7,810	7,810	1,671	748	9,481	8,558

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

Note: (1) exchange rate at the time of appraisal: 1 USD = 83.4 yen = 18,932 VND, (2) exchange rate at the time of ex-post evaluation: 1 yen = 209.88 VND (the average of IFS rates between 2012 and 2020).

3.2.2.2 Project Period

The project period was planned to be until the “completion of the training programs”; however, the training programs were canceled. Therefore, the actual project period was 65 months compared to the planned 58 months, slightly exceeding the plan (112%) when assuming the project completion as “the completion of the installation of the originally procured equipment.” The additional time required for equipment installation was due to the fact that the target hospitals had no experience in international competitive bidding, which took time to confirm the procurement conditions, specifications, etc. Delays were also caused by Vietnamese customs procedures and letter of credit issuance processes.

Table 7: Project period

Item	Plan	Actual
Consultant selection	February – November 2012	August 2012 – April 2013
Consulting services	December 2012 – November 2016	June 2013 – November 2019
Bidding and contract	April 2013 – October 2015	June 2013 – October 2016
Procurement and installation of equipment	September 2014 – September 2016	Original procurement: January 2015 – July 2017 Additional procurement: May 2018 – June 2020
Implementation of training	September 2013 – November 2016	–

Source: Documents provided by JICA and the executing agency

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

The internal rates of return were not calculated at the time of the appraisal, and therefore, they are not calculated in this ex-post evaluation.

As described above, although there were changes in outputs, such as the cancellation of the training programs and additional equipment procurement using the unused balance of the ODA loan, the necessity and appropriateness of the change were recognized, and the outputs were produced as planned (after the change of plan). Although the project period slightly exceeded the plan, the project cost was within the plan. Therefore, the efficiency of the project is high.



Image 2: Radiotherapy equipment installed at C Da Nang Central General Hospital



Image 3: An automated biochemical analyzer installed at Thai Binh Provincial Pediatrics Hospital



Image 4: Magnetic resonance imaging (MRI) equipment installed at the Tay Ninh Provincial General Hospital

3.3 Effectiveness and Impacts⁴ (Rating: ③)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

1) Operation and Effect Indicators

Tables 8-1 and 8-2 show the baseline and target values at the time of appraisal and actual values

⁴ When providing the sub-rating, Effectiveness, and Impacts are to be considered together.

after the completion of the project for the operation and effect indicators set at the time of appraisal. The following operational and effect indicators were set for the project: “annual number of surgical operations,” “annual number of inpatients,” “annual number of outpatients,” “number of patients referred to upper-level hospitals,” “number of medical personnel of the target hospitals who attended training courses provided by upper-level hospitals,” and “number of trainees from lower-level hospitals who attended training.” The “number of medical personnel of the target hospitals who attended training courses provided by upper-level hospitals” was excluded from the quantitative effect due to the cancellation of the training component and will be considered as the impact. Of the four indicators, excluding the “annual number of outpatients,” for which the numbers are inconsistent⁵, three indicators, including the “annual number of surgical operations,” “annual number of inpatients,” and “number of trainees from lower-level hospitals who attended training” achieved the targets in the target year. The target for the “number of patients referred to upper-level hospitals” was achieved in 2021, although there was an increase in the target year. The achievement of all these indicators can be attributed to the fact that the target hospitals have improved their capacity for examination, diagnosis, and treatment techniques, as well as their ability to accept patients, as a result of the equipment provided by the project.

In addition, each hospital has dispatched staff (medical personnel) for training, as shown in “3.3.2.1 Intended Impacts,” and no impact of the cancellation of the training component was observed.

Table 8-1: Percentage increase/decrease from baseline (average of target hospitals)

	Baseline value	Target value	Actual value	
	2009	2018	2020	2021
		2 Years After Completion	2 Years After Completion	3 Years After Completion
Indicator 1: Annual number of surgical operations (cases)	As shown in the table below	Increase by 20%	95.90%	61.76%
Indicator 2: Annual number of inpatients (persons)		Increase by 20%	44.59%	14.17%
Indicator 3: Annual number of outpatients (persons)		Increase by 20%	-	-
Indicator 4: Number of patients referred to upper-level hospitals (cases)		Decrease by 10%	18.93%	-16.91%
Indicator 5: Number of medical personnel of the target hospitals who attend training courses provided by upper-level hospitals (persons)		Increase by 10%	See “3.3.2.1 Intended Impacts”	
Indicator 6: Number of trainees from lower-level hospitals who attended training 1 (persons)		Increase by 5%	132.13%	196.62%

⁵ It was unclear whether the numbers in the ex-ante evaluation sheet were the total number of examinations and consultations. In addition, at the time of ex-post evaluation, the annual count of outpatients was not consistent, as some hospitals counted only consultations, while others counted consultations and examinations combined. Thus, it made comparison based on the same definition impossible.

Source: Documents provided by JICA (target values), documents provided by the target hospitals (actual values)
Notes: (1) Indicator 4: Average of 9 hospitals except for Tay Ninh Provincial General Hospital, for which the figures are inconsistent. (2) Indicators 6: An average of 8 hospitals, excluding Bac Giang Provincial General Hospital and Nam Dinh Provincial Obstetric Hospital that did not respond.

Table 8-2: Baseline values of operation and effect indicators (2009)

Hospital	Annual number of surgical operations	Annual number of inpatients (persons)	Annual number of outpatients (persons)	Number of patients referred to upper-level hospitals (cases)	Number of medical personnel of the target hospitals who attended training courses provided by upper-level hospitals (persons)	Number of trainees from lower-level hospitals who attended training (persons)
Bac Giang Provincial General Hospital	4,168	29,057	36,015	5,310	68	104
Son Tay Inter-District General Hospital	3,227	27,461	25,921	7,689	11	18
Thai Binh Provincial Pediatrics Hospital	-	17,014	26,292	2,740	23	18
Nam Dinh Provincial Obstetric Hospital	3,603	13,949	13,488	860	11	15
Nghe An Obstetrics and Pediatrics Hospital	4,018	27,791	18,074	2,143	28	68
C Da Nang Central General Hospital	2,051	12,617	230,314	1,910	30	25
Binh Dinh Provincial General Hospital	15,022	55,217	474,252	2,065	98	98
Lam Dong Provincial General Hospital	6,256	30,314	31,047	5,069	32	34
Tay Ninh Provincial General Hospital	11,903	39,549	36,650	1,972	93	88
Ninh Thuan Provincial General Hospital	2,393	34,192	35,421	4,249	64	29

Source: Documents provided by JICA

2) Additional Indicators

Although not set as operational/effect indicators, data were collected on (1) “average length of hospital stay” and “hospital infection rate,” for which data had been collected at the time of project completion, and (2) “equipment utilization,” which could be measured as a direct effect of this project.

(1) Average Length of Hospital Stay and Hospital Infection Rate

Table 9 shows the average values for the length of hospital stay and hospital infection rate for the target hospitals. The average length of hospital stay has improved from before the project

implementation (2012). According to interviews with each hospital, the provision of equipment has led to changes in surgical techniques (endoscopic and laparoscopic surgeries, etc.), resulting in reduced treatment times. In addition, concerning the hospital infection rate, the introduction of sterilizers, washing machines, dryers, etc., installed under the project has strengthened infection control measures in hospitals, contributing to a reduction in the hospital infection rate.

Table 9: Average values for the length of hospital stay and hospital infection rate at target hospitals

	2012	2020	2021
Average length of hospital stay (days)	7.55	6.26	6.57
Hospital infection rate ((%)	7.39	2.89	2.12

Source: Questionnaires and interviews with the target hospitals

Note: (1) Responding hospitals were ten hospitals for the average length of stay and seven for the hospital infection rate. (2) The hospital infection rate is the ratio of patients with infection to the total number of inpatients.

(2) Equipment Utilization

Figures 1 and 2 show the utilization of equipment. Each hospital was asked to rate its use of the three most expensive equipment items and all equipment items on a four-point scale (1. fully utilized, 2. mostly utilized, 3. not well utilized, and 4. not utilized at all). The “fully utilized” and “mostly utilized” categories accounted for 97% of the respondents for the expensive equipment, while “fully utilized” and “mostly utilized” accounted for 94% of the respondents for all equipment, indicating that the utilization situation is favorable. Regarding expensive equipment, the most frequently answered items were CT scanners, digital X-ray equipment, magnetic resonance imaging (MRI) equipment, digital subtraction angiography (DSA) equipment, sterilizers, automated biochemistry analyzers, and laparoscopic surgery equipment.

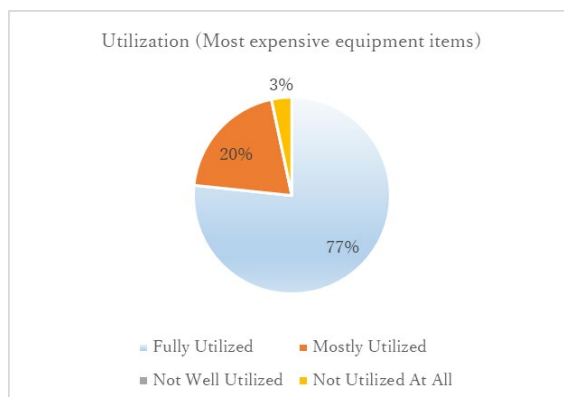


Figure 1: Utilization of expensive equipment items

Source: Questionnaire to the target hospitals

Note: n = 30 (10 hospitals, each with top 3 equipment)

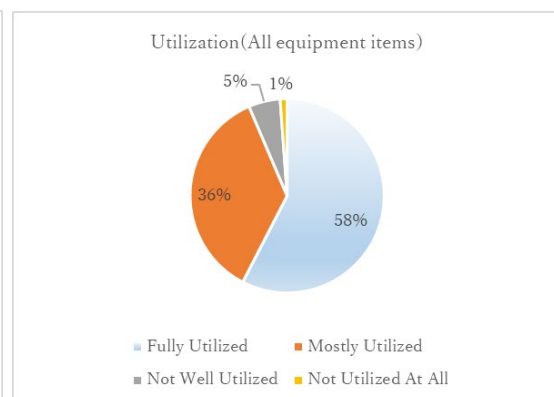


Figure 2: Utilization of all equipment items

Source: Questionnaire to the target hospital

Note: 9 hospitals except Bac Giang Provincial Hospital, n = 778 (responses by equipment type)

As described above, the utilization situation is good; however, the reasons for some of the equipment not being used include (a) high running costs (the cost of reagents and consumables is high) for equipment such as immunoassay analyzer, and autoclave. (Molecular adsorbent recirculating system and high dose rate brachytherapy are even more costly because of the small number of cases), (b) unavailability of spare parts or repair services, due to the absence of the manufacturer or distributor in Vietnam for equipment such as anesthesia apparatus, (c) discontinuation of spare part production during the long period between the time of appraisal for this project and the time of delivery for equipment such as ventilators, (d) replacement with higher-spec equipment due to the model becoming obsolete for equipment such as operating microscope for ophthalmology and , operating microscope for ENT., (e) lack of doctors, or retirement of doctors who can handle the equipment such as heart-lung bypass machine, high-performance liquid chromatography machine and, transcranial doppler ultrasound (all hospitals plan to send doctors for training to obtain certificates to handle the equipment), and so on.

3.3.1.2 Qualitative Effects (Other Effects)

Other effects of the project include the introduction of new medical technology using the equipment installed under the project and the transfer of technology to lower-level hospitals using the equipment installed under the project.

1) Introduction of New Medical Technology

According to interviews with each hospital, much of the equipment installed under the project has been useful in introducing new medical technologies to the hospitals; including 128-slice CT scanners for diagnosis of coronary artery disease and other vascular diseases; 3.0 Tesla MRIs for diagnosis of abdominal, pelvic, and fetal diseases; DSA equipment for cardiac catheterization, vascular ultrasound treatment, congenital heart treatment, pacemaker insertion, and renal treatment; endoscopic surgery equipment for cardiovascular treatment and renal treatment, and radiation equipment for treatment of malignant tumors. In particular, many hospitals revealed that the endoscopic surgical equipment and DSA equipment for cardiovascular and renal treatment have reduced the burden on patients by eliminating the need for incision, eliminated the need to refer patients to upper-level hospitals for cancer treatment, and attracted patients for DSA treatment not only from the hospital's surrounding areas but also from other areas and other provinces. Many hospitals also reported that patients are now coming for DSA treatment not only from the hospital's location but also from neighboring areas and other provinces. In addition, Nam Dinh Obstetrics and Gynecology Hospital is now able to perform many laparoscopic obstetrics and gynecology techniques. Furthermore, according to the hospitals, the introduction of sterilizers has strengthened awareness and behavior regarding hospital infections.

2) Technology Transfer to Lower-Level Hospitals

The target hospitals in the project are actively transferring clinical skills to lower-level hospitals, assisting them in treating complex cases, and providing training for their staff, using the equipment installed under the project as teaching materials. The equipment used for training at the lower-level hospitals includes endoscopic surgical equipment, CT scanners, MRIs, ventilators, ultrasound equipment, and automated biochemistry analyzers.

3.3.2 Impacts

3.3.2.1 Intended Impacts

As an impact of the Project, changes in hospital mortality rates are shown below. According to each hospital, improving diagnostic and treatment (including resuscitation techniques) capabilities through introducing equipment under the project and training at each hospital has resulted in a certain degree of decrease in the mortality rate. On the other hand, the acceptance of critically ill patients has increased at the target hospitals due to the improved technology, and the hospital mortality rates also increased in 2020 due to COVID-19.

Table 10: Hospital mortality rate

	2012	2018	2019	2020	2021
Hospital mortality rate	0.46%	0.11%	0.35%	0.38%	0.17%

Source: Questionnaire and interviews with target hospitals

Note: Responses from 7 hospitals

Other impacts include the response to the COVID-19. Many of the hospitals in the project played a central role in the response to COVID-19. During the outbreak, Tay Ninh Provincial General Hospital functioned as a dedicated hospital for COVID-19 for six months, and Bac Giang Provincial General Hospital established a COVID-19 center and also treated patients in the ICU. Thai Binh Provincial Pediatrics Hospital also served as a COVID-19 center for six months, accepting both children and adults. In these hospitals, ventilators, patient monitors, automatic biochemical analyzers, PCR equipment, ELISA analyzers (immunological analyzers using antibodies), X-ray equipment, diagnostic ultrasound equipment, color Doppler ultrasound equipment, and infection control-related equipment (sterilizers, washing machines), all of which were provided under this project, were utilized.

In addition, although the “training component” of the project was canceled, each hospital dispatched its staff (medical personnel) to training programs at upper-level hospitals and other institutions to improve its skills.

Table 11: Number of medical personnel of the target hospitals who attended training courses provided by upper-level hospitals (Percentage increase from baseline value)

	2009	Target value	2020	2021
Number of medical personnel of the target hospitals who attended training courses provided by upper-level hospitals	See Table8-2	Increase by 10%	16.28%	55.07%

Source: Questionnaire and interviews with target hospitals

Note: An average of 8 hospitals

3.3.2.2 Other Positive and Negative Impacts

1) Impacts on the Environment

The project was judged to have minimal undesirable impact on the environment under the *JICA Guidelines for Environmental and Social Considerations* (formulated in 2010) and was classified as Category C. In the target hospitals, medical waste and wastewater are appropriately disposed of, and no negative environmental impact is observed. Regarding medical waste, each hospital classifies medical waste according to the regulations of MOH and the Ministry of Natural Resources and Environment. The waste is disposed of either by contracting with a third party or by incineration at the hospitals. Regarding wastewater treatment, equipment has been installed, and each hospital conducts quarterly water quality inspections and monitoring. According to the survey results, the indicators for wastewater treatment are adequate.

2) Resettlement and Land Acquisition

Land acquisition and resettlement have not occurred.

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

Based on the policy of prioritizing women and children, the project is providing medical equipment to obstetrics and pediatrics hospitals such as Nam Dinh Provincial Obstetrics Hospital, Nghe An Provincial Obstetrics and Pediatrics Hospital, and Thai Binh Provincial Pediatrics Hospital, as well as obstetrics and pediatrics departments in general hospitals.

In terms of the impact on women in particular, the introduction of mammography has improved the accuracy of diagnosis, and laparoscopic obstetrics and gynecology techniques (total laparoscopic hysterectomy, laparoscopic ovarian cyst removal, laparoscopic treatment of ectopic pregnancy and endometriosis, etc.) can now be performed using laparoscopic surgical equipment, reducing the burden on the body. Thus, in addition to general medical services, services for women's diseases have been improved.

As for the marginalized people, the poverty rate in Nghe An and Ninh Thuan provinces was higher than the national average among the provinces where the target hospitals are located at the

time of the ex-post evaluation (the poverty rate was 10.9, 9.0, and 4.8, respectively).⁶ Interviews with the hospitals revealed that many poor people visited the target hospitals and benefited from the improved medical services provided through this project. In addition, improving each hospital's capacity and ability to receive patients has led to equitable access to medical care for people with low incomes.

As described above, in terms of quantitative effects, three out of the four indicators (excluding one inconsistent indicator) achieved their target values in the target year, and the status of equipment utilization is also favorable. As qualitative effects, technical guidance and training were provided to lower-level hospitals using equipment from the project, and new technologies were put into practice as a result of the project. Regarding the impact of the project, the hospital mortality rate has decreased, and the project has contributed to improving the health of the local population, including the response to COVID-19. There have been no negative impacts on environmental and social aspects, and the project has brought a certain amount of positive benefits to gender equality and marginalized people.

In conclusion, this project has mostly achieved its objectives.

Therefore, effectiveness and impacts of the project are high.

3.4 Sustainability (Rating: ③)

3.4.1 Policy and System

As indicated in “3.1.1.1 Consistency with Development Plan of Vietnam,” sustainability in terms of policy and system is ensured through the *Five-Year Socio-Economic Development Plan (2021-2025)*, which includes priority on prevention and control of infectious and non-communicable diseases and the development of hospital networks.

3.4.2 Institutional/Organizational Aspect

Each target hospital is responsible for the operation and maintenance of the medical equipment installed under the project. Each hospital has an equipment maintenance and management department, and technicians are assigned to this department. For expensive equipment (MRIs, CT scanners, DSA equipment, etc.), a maintenance contract is concluded with an outside equipment maintenance company, and regular maintenance services are provided. The average number of equipment maintenance personnel at each hospital is five. Although some hospitals have found it challenging to hire new technicians due to competition from the private sector, and the number of technicians is not always sufficient, the current number of technicians is generally sufficient to

⁶ Source: *RESULTS OF THE VIET NAM HOUSEHOLD LIVING STANDARDS SURVEY 2020* (General Statistics Office of Vietnam)

maintain the equipment without any problems.

Based on the above, the operation and maintenance structure of each hospital is clear, and the number of necessary staff is generally secured, which indicates that sustainability in terms of institutional/organizational aspect is generally ensured.

3.4.3 Technical Aspect

The target hospitals have full-time maintenance and management staff. Most of them are electrical engineers; however, they regularly receive training in medical equipment maintenance and management from Hanoi University of Science and Technology and other institutions. Young staff members have been in their positions for about five years, while those at the management level have been with the hospitals for 15 to 20 years or more, which indicates that they have a wealth of experience. They are fully capable of performing minor repairs, identifying problems, and ordering repairs to specialized vendors and supervising their work. As mentioned above, expensive equipment has regular maintenance contracts and is cleaned and inspected by specialized contractors regularly.

As described above, the engineers are experienced, their capacity has been regularly updated, and their skills in maintenance and management are secured.

3.4.4 Financial Aspect

In *Decree 43/2006/ND-CP*, which came into effect in August 2006, the Government of Vietnam stipulated an autonomous status for public medical institutions and encouraged self-help efforts to improve profitability. At the time of the ex-post evaluation, the target hospitals were not fully autonomous but partially autonomous, and their primary sources of funding were copayment, reimbursement of medical fees, and some government subsidies. The Vietnamese government's initiatives to promote self-help efforts to improve the profitability of public medical institutions under independent accounting system and to promote full coverage of medical insurance have resulted in an improved profit structure at the time of project completion compared to before the project implementation. At the time of ex-post evaluation, it was confirmed that the average amount of copayment and reimbursement of medical fees of the ten hospitals increased from 75,801 million Vietnamese dong (VND) in 2012 to VND 246,353 million in 2018 and VND 290,244 million in 2021, which indicates that their independent revenue resources have continued to increase significantly. These financial resources can be used to cover the cost of equipment maintenance. At the same time, since the hospitals are not completely autonomous, they could obtain funds from the Provincial Department of Health when they need to spend high amounts on facilities and equipment.

Maintenance costs vary from hospital to hospital, but they aim to allocate about 1.0% of income or 1.0% of the value of equipment. According to the questionnaires and interviews, nine of the

ten hospitals indicated that their maintenance budget are sufficient.

As a result of the above, financial sustainability is generally ensured, as the hospitals expect to increase their own resources in terms of income and receive funds from the Provincial Department of Health as needed.

Table 12: Income and expenditure of the target hospitals (Average of 10 Hospitals)

(Unit: million VND)

	2019	2020	2021
Total Income	326,810	356,764	347,801
Of which copayment	50,392	53,744	73,226
Of which reimbursement of medical fees	223,035	232,551	217,017
Total of copayment and reimbursement of medical fees	273,427	286,295	290,244
Total Expenses	296,155	316,797	332,212
Of which expenses for O&M	2,293	3,400	2,444
Surplus/Deficit	30,655	39,967	15,589

Source: Questionnaire and interviews with the target hospitals, documents provided by JICA

3.4.5 Environmental and Social Aspects

No significant risks to the sustainability of the project effects from an environmental and social aspects are observed.

3.4.6 Preventative Measures to Risks

No risks that were not foreseen at the time of the appraisal have occurred during the project implementation.

3.4.7 Status of Operation and Maintenance

Figures 3 and 4 show the physical condition of the three most expensive equipment and all equipment at each hospital. When the respondents were asked to rate the physical condition of the equipment on a three-point scale (1. Good, 2. Not good, but can be used, 3. Failure), more than 90% of the equipment in both categories was in good condition. As mentioned in “3.3.1.1 Quantitative Effects,” some equipment cannot be repaired, and spare parts are not produced. Still, in general, replacement is carried out without problems in securing and purchasing spare parts, and equipment that has failed in the past is repaired appropriately.

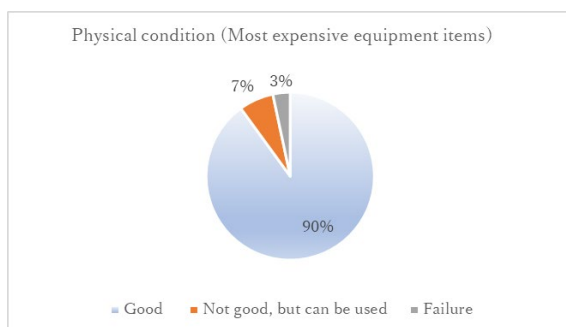


Figure 3: Physical condition of expensive equipment items

Source: Questionnaire to the target hospitals

Note: n = 30 (10 hospitals, each with top 3 equipment)

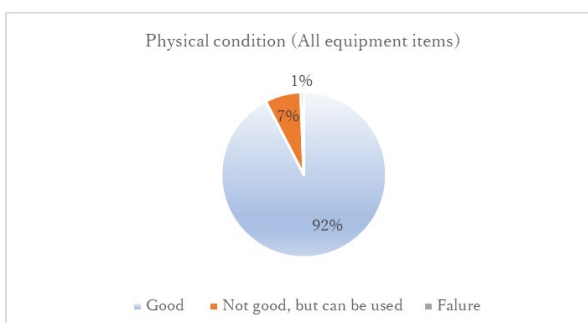


Figure 4: Physical condition of all equipment items

Source: Questionnaire to the target hospital

Note: 9 hospitals except Bac Giang Provincial Hospital, n = 814 (responses by equipment type)

In each hospital, daily inspections are conducted by each medical department, and any problems are communicated to the equipment maintenance department. Each hospital records the condition of the equipment in a record book each time it is used. During the field visit at the time of ex-post evaluation, it was confirmed that all ten hospitals recorded the use and condition of each piece of equipment in a record book. In all of the hospitals, the equipment maintenance departments have established annual maintenance plans and perform periodic (weekly, monthly, every three months, etc.) inspections and maintenance.

For actual repairs, minor repairs are handled by hospital technicians, while other repairs are outsourced to manufacturers or outside contractors. CT scanners, X-ray equipment, DSA, and other expensive equipment have annual maintenance contracts, which include cleaning, inspection, spare parts replacement, monitoring, and problem detection. Significant repairs are outsourced separately.

Thus, the physical condition of each piece of equipment, and its operation and maintenance status, including daily inspections, are generally good.

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

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project was implemented to improve the quality of the medical service system in 10 provinces and cities in Vietnam by strengthening the overall capacity of provincial hospitals through the provision of medical equipment and the development of human resources, thereby contributing to improving people's health. The project is consistent with Vietnam's development

plan and needs at both the times of appraisal and ex-post evaluation, and its relevance can be confirmed. Although no specific collaborations or outcomes are planned or implemented with other projects of JICA and development partners, the project is consistent with Japan's ODA policy for Vietnam. Therefore, the relevance and coherence are high. The project produced outputs in line with the revised plan, and although the project period slightly exceeded the plan, the project cost was within the plan, and therefore, the efficiency is high. Among the expected effects, the "annual number of surgical operations," "annual number of inpatients," and the "number of trainees from lower-level hospitals who attended training" achieved their target values in the target year, and the "number of patients referred to upper-level hospitals," also achieved its target value in the following year. In addition, "average length of hospital stay" and "hospital infection rate" as additional indicators also showed improvement, and "utilization of equipment" was favorable. As for the impact, the project is considered to have contributed to improving residents' health by improving the "hospital mortality rate" and responding to COVID-19. Thus, the effectiveness and impacts are high. Although there are some minor problems in the operation and maintenance of the project equipment in terms of institutional/organizational and financial aspects as well as operation and maintenance status, the prospects for improvement and resolution are high. Therefore, the sustainability of the project's effects is high. In light of the above, the project is evaluated to be highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

None.

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

Need for selection of the latest equipment and flexible adjustment of package contents under medical equipment procurement projects

Although there was not a significant delay in the project period of this project, the preparatory survey was conducted in March 2010, and the actual delivery was in 2016-2017, six to seven years after the initial equipment selection. There were cases where the procured equipment (models) was insufficient to handle the needs of the target hospitals due to the expansion of their functions as a result of population growth during that period or due to the relatively rapid technological progress and obsolescence of medical equipment. Since this was the first time each target hospital was involved in an ODA loan project, it was difficult to predict how long it would take to deliver the equipment, but many said that they would have selected more advanced models if they had known it would take such a long time. To effectively use equipment, it is desirable to

choose the latest specifications and models when selecting equipment, especially concerning highly specialized equipment. It is also desirable to implement assistance to facilitate first-time ODA loan procurement. Alternatively, it is desirable to flexibly adjust package contents to accommodate frequent model changes of equipment.

Need to understand the problems that may arise in STEP projects for hospital projects

This project was implemented as a STEP project; however, the training component was canceled due to the lack of prospects for bids from Japanese companies. In addition, there were cases where the procured equipment could not be repaired because there was no after-sales service due to the lack of a manufacturer or distributor. For STEP projects, it is necessary to adopt them after assuming that such problems may arise and considering how to deal with them if they do occur. At the same time, it is necessary to set up the project component in a way that meets the STEP procurement conditions, for example, by providing training in other forms, such as technical assistance under finance and investment accounts.

5. Non-Score Criteria

5.1. Performance

5.1.1 Objective Perspective

According to MOH, JICA provided prompt and positive support, including responses to inquiries and consent. Since the project covered multiple provinces, the CPMU was established as the contact point to supervise the implementation of the project, and this system worked efficiently and effectively with no significant problems. However, since the CPMU was to be dissolved after the project was completed, closer contact with the Provincial People's Committees would also have been necessary during the implementation of the project.

(End)

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
1. Project Outputs	1) Procurement of medical equipment to the target hospitals: Medical operation/consultation equipment (operating tables, endoscopes, laparoscopes, anesthesia equipment, etc.), ICU equipment (ventilators, monitors, etc.), diagnostic imaging equipment (CT scanners, X-ray equipment, etc.), laboratory and analysis equipment (blood analyzers, electrophoresis equipment, etc.), sanitation control equipment (sterilization equipment, etc.), and other equipment totaling about 1,486 pieces. 2) Training programs for the ten hospitals (medical care skills, equipment maintenance/management, hospital management, etc.) 3) Consulting services	1) Procurement of medical equipment: a total of 2,001 pieces of equipment assumed at the time of planning 2) Training programs: Cancelled 3) Consulting services: as planned
2. Project Period	February 2012 – November 2016 (58 months)	March 2012 – July 2017 (65 months) (Completion of installation of originally procured equipment)
3. Project Cost Amount Paid in Foreign Currency Amount Paid in Local Currency Total ODA Loan Portion Exchange Rate	8,155million yen 2,029million yen (460,587million VND) 10,184million yen 8,693million yen 1VND = 0.004405 yen (As of June 2011)	7,810million yen 1,671million yen (350,709million VND) 9,481million yen 8,558million yen 1VND = 0.004765 yen (Average between 2012 and 2020)
4. Final Disbursement	June 2020	

Socialist Republic of Viet Nam

FY2022 Ex-Post Evaluation of Japanese ODA Loan

“Hanoi-HCMC Railway Line Bridges Safety Improvement Project (I-III)”

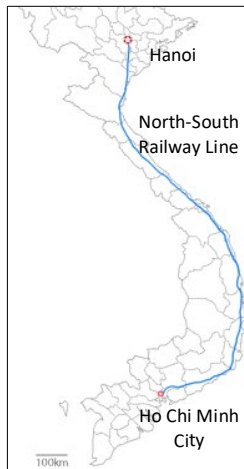
External Evaluator: Takako Haraguchi, i2i Communication, Ltd.

0. Summary

This project aimed to ensure the safety of rail service, shorten passenger and freight transport time, and boost transportation volume by replacing 44 severely age-worn bridges on the rail line between Hanoi and Ho Chi Minh City (the North-South Railway Line, total length: 1,700 km). The project plan aligns with Viet Nam’s development policy and needs, as well as Japan’s aid policy, making its relevance and coherence high. As a result of the project implementation, speed restrictions on the bridges were lifted, allowing trains to run safely at normal speeds. Additionally, improvements to level crossings and grade separations have led to a decrease in accidents at railway-road intersections. Although the volume of railway transportation fell short of expectations due to the rapid development of air and road transport, the project objective was largely achieved as the key outcome of ensuring safety was fully met. The anticipated impact of contributing to sustainable economic growth in the regions along the line could not be confirmed. However, the acquisition and utilization of Japanese technology and the improvement of convenience for residents through the construction of side roads and the utilization of existing bridges were confirmed. Therefore, the effectiveness and impacts are high. Efficiency is low because the project cost exceeded the plan and the project period significantly exceeded the plan. Regarding the operation and maintenance of the project, there are some technical and financial issues due to the lack of formalization of standard operating procedures in Viet Nam for the maintenance of parts using Japanese technology and products. However, there are prospects for addressing these issues, and other aspects are mostly good, making the sustainability high.

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

1. Project Description



Project Location



Image 1: Do Len Bridge in Thanh Hoa Province
(source: Photographed by the ex-post evaluator)

1.1 Background

Railways in Viet Nam began construction during the 19th-century French colonial era. Completed in 1935, the North-South Railway Line (initially the Hanoi-Saigon Line, currently the Hanoi-Ho Chi Minh City Line, total length: approximately 1,700 km) held the largest share in terms of distance and passenger and freight transportation volume, making it the country's most critical route. This line had suffered extensive damage during the war years from 1946 to 1975 but had been in operation since its reopening in 1976, thanks to ongoing bridge replacements, repairs, and track improvements. However, due to budget and material shortages and technical issues, these repairs and improvements were merely stopgap measures. The line also had structural problems, such as sharp curves, steep gradients, and small tunnel cross sections, posing significant safety challenges. Particularly concerning were the bridges, many of which had deteriorated significantly over the years. Speed restrictions of 40 km/h or lower had to be imposed for safety reasons, making their renovation an urgent issue for ensuring railway safety and enhancing transport capacity.

Out of the total 1,452 bridges (with a combined length of 370 km) on the North-South Railway Line, 1,064 bridges (260 km) had been renovated by 2003. This included emergency repairs to 19 particularly deteriorated bridges under the preceding ODA loan projects "Hanoi-Ho Chi Minh City Railway Bridge Rehabilitation Project (1-3)" (loan agreements signed in 1994, 1995, and 1996). However, of the remaining 388 bridges (110 km), urgent renovations were still needed for 237 bridges (75 km). Under such circumstances, the Government of Viet Nam requested an ODA loan project targeting 44 relatively large-scale bridges with high urgency, leading to the implementation of this project. In the first phase of this project, 17 bridges in the northern region were prioritized among the 44 bridges, and all 44 bridges were targeted in the second and third phases.

1.2 Project Outline

This project aims to ensure the safety of rail service, shorten passenger and freight transport time, and boost transportation volume by replacing 44 severely age-worn bridges on the rail line between Hanoi and Ho Chi Minh City (the North-South Railway Line, total length: 1,700 km), thereby contributing to the sustainable economic growth of the regions along the line.

		Phase 1	Phase 2	Phase 3
Loan Approved Amount / Disbursed Amount		8,222 million yen / 8,078 million yen	11,737 million yen / 11,481 million yen	13,790 million yen / 12,582 million yen
Exchange of Notes Date / Loan Agreement Signing Date		March 2004 / March 2004	March 2007 / March 2007	March 2013 / March 2013
Terms and Conditions	Interest Rate	0.75%	0.40%	0.20% (0.01% for the consulting services and interest during construction)
	Repayment Period	40 years	40 years	40 years
	(Grace period)	(12 years)	(10 years)	(10 years)
	Conditions for Procurement	Tied (Special Terms for Economic Partnership (STEP))		
Borrower / Executing Agency		The Government of the Socialist Republic of Viet Nam / Ministry of Transport	The Government of the Socialist Republic of Viet Nam / Vietnam Railways	The Government of the Socialist Republic of Viet Nam / Ministry of Transport
Project Completion		November 2017		
Target Area		Between Hanoi and Hue	Between Hanoi and Ho Chi Minh City	
Main Contractors (Over 1 billion yen)		<u>Phase 1</u> Yokogawa Bridge Corporation (Japan) / Tekken Corporation (Japan) / Thang Long Construction Corporation (Viet Nam) (JV), Mitsui Engineering & Shipbuilding Co., Ltd. (Japan) / Rinkai Construction Co., Ltd. (Japan) / Civil Engineering Construction Corporation No. 1 (Viet Nam) (JV) <u>Phase 1 to Phase 3</u>		

	Taisei Corporation (Japan) / Mitsui Engineering & Shipbuilding Co., Ltd. (Japan) / Civil Engineering Construction Corporation No.1 (Viet Nam) (JV), Taisei Corporation (Japan) / Mitsui Engineering & Shipbuilding Co., Ltd. (Japan) / Rinkai Construction Co., Ltd. (Japan) / Civil Engineering Construction Corporation No. 1 (Viet Nam) (JV) <u>Phase 2</u> Yokogawa Bridge Corporation (Japan) / Marubeni Corporation (Japan) / Tekken Corporation (Japan) / Thang Long Construction Corporation (Viet Nam) (JV), Itochu Corporation (Japan) <u>Phase 2 to Phase 3</u> DPS Bridge Works Co., Ltd. (Japan) / Mitsui Engineering & Shipbuilding Co., Ltd. (Japan) / Civil Engineering Construction Corporation No. 1 (Viet Nam) (JV) <u>Phase 3</u> Mitsui Engineering & Shipbuilding Co., Ltd. (Japan) / Tekken Corporation (Japan) / Thang Long Construction Corporation (Viet Nam) (JV), Rinkai Construction Co., Ltd. (Japan) / Railway Construction Corporation Joint Stock Company (Viet Nam) (JV), Taisei Corporation (Japan) / Mitsui Engineering & Shipbuilding Co., Ltd. (Japan) / Civil Engineering Construction Corporation No. 1 (Viet Nam) (JV)
Main Consultants (Over 100 million yen)	<u>Phase 1 to Phase 3</u> Japan Railway Technical Service (Japan) / Chodai Co., Ltd. (Japan) / Oriental Consultants Co., Ltd. (Japan) (JV) <u>Phase 2 to Phase 3</u> Japan Bridge and Structure Institute, Inc. (Japan) / Tonichi Engineering Consultants, Inc. (Japan) / Oriental Consultants Co., Ltd. (Japan) (JV)
Related Studies (Feasibility Studies, etc.)	• “Special Assistance for Project Implementation for the Hanoi-Ho Chi Minh City Railway Bridge Rehabilitation Project, I and II” (translated from Japanese), Japan International Cooperation Agency (JICA) or the former Japan Bank for International Cooperation (JBIC), 1997 • “Feasibility Study Report,” Railway Investment & Construction Consultant Company (RICCC), 2001 (targeting 34 bridges)

	• “F/S Review Study for the Hanoi-Ho Chi Minh City Railway Bridge Rehabilitation Project (translated from Japanese),” Japan Transportation Consultants, Inc., 2003 (Feasibility Study (F/S) review, information gathering on the F/S statuses of additional ten bridges, etc.) • “Feasibility Study Report,” RICCC, 2003 (F/S including the additional 10 bridges) • “Special Assistance for Project Implementation (SAPI) for Vietnam Railways,” JICA, 2008
Related Projects	<u>JICA Technical Cooperation</u> • National Transport Strategy Study for the Socialist Republic of Vietnam (VITRANSS) (1999-2001) • Comprehensive Study on the Sustainable Development of Transport System in Vietnam (VITRANSS2) (2007-2010) <u>ODA Loan</u> • Hanoi-Ho Chi Minh City Railway Bridge Rehabilitation Project (1) (January 1994) • Hanoi-Ho Chi Minh City Railway Bridge Rehabilitation Project (2) (April 1995) • Hanoi-Ho Chi Minh City Railway Bridge Rehabilitation Project (3) (March 1996)

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: October 2022-January 2024

Duration of the Field Study: December 4-31, 2022 and April 16-22, 2023

3. Results of the Evaluation (Overall Rating: B¹)

3.1 Relevance/Coherence (Rating: ③²)

3.1.1 Relevance (Rating: ③)

3.1.1.1 Consistency with the Development Plan of Viet Nam

The national and sector development plans at the time of the appraisal for each phase and of the ex-post evaluation aim for economic growth through the development of transportation infrastructure. Therefore, the consistency of the project with the country's development plans is high. First, regarding the national development plans at the time of the appraisals, the *Five-Year Socio-Economic Development Plans* (2001-2005 and 2006-2010) focused on modernizing transportation infrastructure, including railways. The *Five-Year Socio-Economic Development Plan* (2011-2015) aimed for the early completion of ongoing transportation infrastructure projects. Second, regarding the transport sector development plans, the 10-year master plan for the railway sector developed through the National Transport Development Strategy for the Socialist Republic of Viet Nam (VITRANSS, 2000), at the time of the appraisals for Phase 1 and 2, designated the renovation of aging bridges as one of the top-priority projects. At the time of the appraisal for Phase 3, the *Transport Development Strategy up to 2020 with a Vision Toward 2030* (Prime Minister's Decision No. 35 of 2008) set forth objectives for the railway sector including improvements to existing infrastructure to meet both Vietnamese and regional railway standards, along with the construction of a North-South high-speed railway and the development of urban railways. Regarding the railway sub-sector development plans, the *Railway Development Master Plan* (Prime Minister's Decision No. 6 of 2002, revised by Prime Minister's Decision No. 1436 of 2009) aimed to modernize railway transportation, including facilities and rolling stock, and to increase speed by 2020. It also sought to improve the share of railway transportation among all modes of transport. The rehabilitation of bridges on the North-South Railway Line was designated as one of the top-priority projects. Also, in the *Railway Development Strategy up to 2020 with a Vision Toward 2050* (Prime Minister's Decision No. 1686 of 2008), the goals included enhancing railway transport capacity through improvements to existing lines and new constructions, increasing operational speed, and expanding both passenger and freight transportation volumes.

At the time of the ex-post evaluation, the focus of railway development in the national development plan, the *Five-Year Socio-Economic Development Plan* (2021-2025), shifted to the development of urban railways and preparations for the North-South high-speed railway. However, in the transport sector development plan, namely, the revised version of the *Transport Development Strategy up to 2020 with a Vision Toward 2030* (Prime Minister's Decision No. 355 of 2013), the improvement and modernization of the North-South Railway Line continue to be targeted goals. Furthermore, the railway sub-sector development plan,

¹ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

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

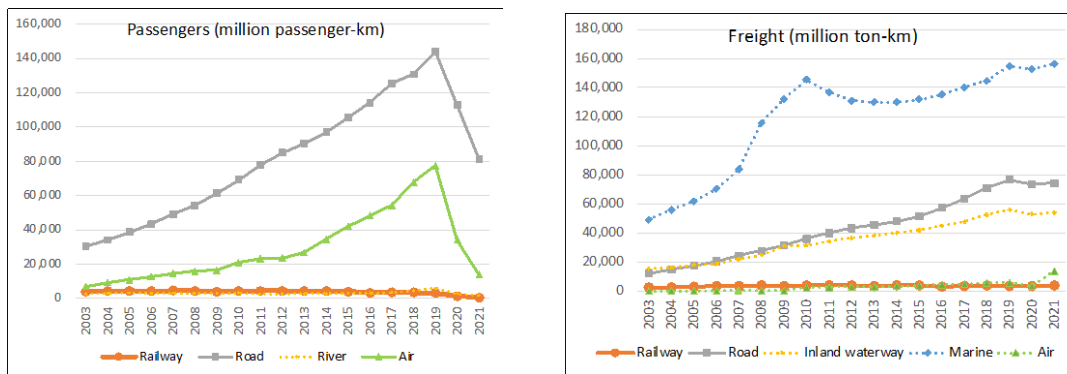
known as the *Master Plan on the Railway Network to 2030 with a Vision Toward 2050* (Prime Minister’s Decision No. 1769 of 2021), aims to renovate and upgrade existing railway routes for more efficient operation and uninterrupted connections with international railway routes. It targets the improvement of infrastructure for seven existing lines, including the North-South Railway Line, to enhance railway safety.

3.1.1.2 Consistency with the Development Needs of Viet Nam

From the time of the appraisal for Phase 1 to the time of the ex-post evaluation, the need for safe operation of the North-South Railway Line has remained high, and this project is consistent with that need. At the time of the appraisals, as stated in “1.1 Background,” there was an urgent need for the safe operation of the North-South Railway Line through the renovation of its aging bridges. The share of railway transport on the North-South Railway Line in the country’s total railway transport has increased from 59% to 73% for passengers and from 83% to 93% for freight between 2003 and 2019.³ This highlights the continued importance of maintaining safe operations on this railway line. According to the Railway Project Management Unit (PMU-Rail) under the Ministry of Transport (MOT), the executing agency, the North-South Railway Line has 1,504 bridges (with a total length of 40.4 km), of which approximately 400 smaller bridges still require renovations, as of the time of the ex-post evaluation. Therefore, the PMU-Rail continues to carry out renovations of about five bridges annually using funds from the Vietnamese government. As a result of these efforts, as of December 2022, there are no bridges on the North-South Railway Line where speed limits of 40 km/h or lower have been set.

While it does not affect safety needs, quantitatively speaking, the proportion of railway transport in Viet Nam’s transportation volume in all modes has decreased: from 2003 to 2019, the share decreased from 9.2% to 1.4% for passengers and from 3.4% to 1.3% for freight. The transportation volume itself is also declining, specifically for passengers. This is due to a significant increase in the volume of road and air transport, which have advantages over railway in terms of convenience and travel time (Figure 1). According to the MOT and the Department of Transport (DOT) of the provinces visited, the connectivity between railway and other modes of transport is not sufficiently established and remains a future challenge (also mentioned in “3.3.2.1 Intended Impacts”).

³ To exclude the impact of COVID-19 on transportation volume (particularly, the sharp decline in passenger transportation volume in 2020 and 2021 is believed to be due to pandemic-related travel restrictions), trends up to 2019 are being considered. Note that all transportation volume data in this section are based on passenger-km for passengers and ton-km for freight.



Source: Created based on data provided by the executing agency.

Figure 1: Passenger and freight transportation volume by mode of transport in Viet Nam

3.1.1.3 Appropriateness of the Project Plan and Approach

The project logic (common to all phases) appears to be appropriate. However, the operation and effect indicators set for the project objectives of “shortening transport time” and “boosting transportation volume” could not adequately capture the direct effects of the project. For the objective of “shortening transport time,” the set indicator “travel time between Hanoi and Ho Chi Minh City” is not closely related to the time reduction due to bridge replacements. (Therefore, the effectiveness and impacts (discussed in “3.3.1.1 Quantitative Effects”) were verified by examining the changes in speed limits for each target section and the factors affecting them.) For the objective of “boosting transportation volume,” the set indicator “annual railway transport volume between Hanoi and Ho Chi Minh City” may have had target values that were based on overly ambitious assumptions on the annual growth rate of transportation volume when viewed in the context of the railway transportation trends at the time.⁴ However, this issue is not considered to be a factor that hinders the realization or sustainability of the project’s effects, and it therefore does not impact the sub-rating for relevance.

Phase 3 of this project was implemented due to a funding shortfall caused by an economic downturn in Viet Nam after the appraisal of Phase 2, necessitating an additional loan (see “3.2 Efficiency”). JICA considered the implementation of Phase 3 to be a reasonable measure at the time. No issues were identified in the risk analysis, implementation structure, and work plans at the appraisals of Phase 1 and Phase 2, and the additional loan is considered to have been an unavoidable response.

From the perspective of consideration for marginalized people, there was no specific mention in the appraisal documents and the ex-ante evaluation report. However, given the

⁴ The effectiveness of this project was evaluated based on the actual performance against the target values set at the appraisal of Phase 3. According to materials provided by JICA and VNR, the annual average growth rate of transportation volume on the North-South Railway Line up to the time of the Phase 3 appraisal was 1.4% for passengers and 6.6% for freight in actual terms (from 2005 to 2012), whereas the projections (plans) for the same period had been 3.7% for passengers and 10.6% for freight.

nature of this project, which involved the replacement of railway bridges, it is believed that there are no particular points that need to be examined.

3.1.2 Coherence (Rating: ②)

3.1.2.1 Consistency with Japan's ODA Policy

The support for the North-South mainline transport is explicitly stated in the development cooperation policies at the time of each phase's appraisal, making it consistent with this project. At the time of the appraisal for Phase 1, JICA (formerly JBIC) stated in its *Medium-Term Strategy for Overseas Economic Cooperation Operations* (April 2002) that under the priority area of "Infrastructure Development for Economic Growth," it would continue to "implement support for the development of economic and social infrastructure to promote economic growth." In the corresponding *Country Assistance Strategy*, it was stated that in the transportation sector, while keeping in mind the construction of a comprehensive distribution system for freight and passenger transport, support would be implemented for projects where infrastructure development, institutional reforms, and human resource development organically bring about effects, taking into account projects' economic viability and urgency. Furthermore, the role of the railway sector was expected to expand for the improvement of intermodal balance and the reduction of logistics costs between the North and South. Support was planned for the repair and replacement of bridges with a high degree of urgency to restore safety.

At the time of the appraisal for Phase 2, JICA (formerly JBIC) followed the same approach as outlined in the above-mentioned *Medium-Term Strategy for Overseas Economic Cooperation Operations* in its updated version (April 2005). In the corresponding *Country Assistance Strategy*, it emphasized support for the development of economic infrastructure, such as transportation, as a priority area for achieving sustainable economic growth. The *Japan's Country Assistance Program for Viet Nam* (April 2004) stated that it would focus on support related to international and domestic trunk line transport (priority economic growth areas in the North and South, and the North-South mainline) as well as urban transport (Hanoi and Ho Chi Minh City). At the time of the appraisal for Phase 3, the *Country Assistance Program for Viet Nam* (July 2009) highlighted "Urban Development, Network Development for Transport and Communications" as key development issues. It stated that in order to meet the increasing demand for inter-city transport, support would be provided with due consideration for appropriate prioritization and road maps, with a focus on selectivity and concentration, while also taking into account the perspective of logistics efficiency, for arterial roads (including the North-South expressway), railways (including the North-South high-speed railway), ports, and airports. In Phases 2 and 3, compared to Phase 1, the focus in railway development shifted more toward urban railways and the North-South high-speed railway. However, it is evident that support for the existing North-South Railway Line continued to be included as a target for assistance.

3.1.2.2 Internal Coherence

In this project, no specific collaboration or coordination with other JICA projects took place.⁵

3.1.2.3 External Coherence

In this project, there was no specific collaboration or coordination with projects conducted by other Japanese agencies, other donors, or international frameworks.

Thus, while this project did not have specific collaboration or coordination with other projects, it shows consistency with Viet Nam's development plans and development needs and appropriateness in project planning and approach. Therefore, its relevance and coherence are high.

3.2 Efficiency (Rating: ①)⁶

3.2.1 Project Outputs

The outputs of this project consisted of civil works and equipment procurement (replacement of 44 bridges on the North-South Railway Line, renovation of bridge approach sections including track construction, construction of ancillary facilities, and procurement of operation and maintenance (O&M) equipment), as well as consulting services. While there were some modifications, these were largely completed as planned, and no issues were identified with the changes.

The civil works and equipment procurement were largely completed as planned, as detailed in the table below. This was also confirmed through visual inspection at the time of the ex-post evaluation.⁷ The main scope changes included some design modifications during the detailed design phase (such as changing the location of the new Nam O Bridge to the same position as the existing bridge to reduce the area for involuntary resettlement, altering some PC girders to

⁵ Among those mentioned as related projects in "1.2 Project Outline," VTRANSS (1999-) and VTRANSS2 (2007-), which proposed transportation plans, could be said to be related to the relevance of this project in the sense that they supported the formulation of Viet Nam's development policies. However, the need for bridge renovation on the North-South Railway Line had been recognized even before the implementation of these projects, and there was no specific collaboration or coordination with them, nor did they bring about any synergistic effects for the achievement of this project's objectives. Additionally, the Hanoi-Ho Chi Minh City Railway Bridge Rehabilitation Project (1-3) (1994-) contributed to the achievement of the project objectives through mutual complementation with this project. However, since they are preceding projects to this project, they are excluded from the consideration of internal coherence.

⁶ For the sub-rating of efficiency, the comparison between planned and actual results was primarily based on the plan at the time of the Phase 2 appraisal. This is because Phase 1 targeted only 17 bridges for replacement, and the plan to replace all 44 bridges was made at the time of the Phase 2 appraisal. However, when confirming the project period—a component of inputs—the starting point for the planned value, defined as the scheduled loan agreement signing date, was based on the scheduled date for the Phase 1 loan agreement signing.

⁷ In this ex-post evaluation, the evaluator visually confirmed 11 out of the 44 bridges, as well as the tracks and ancillary facilities near them. The remaining 33 bridges were confirmed through interviews with the PMU-Rail, VNR, and their subsidiaries, the regional management maintenance companies (RMMCs) responsible for infrastructure maintenance in different sections.

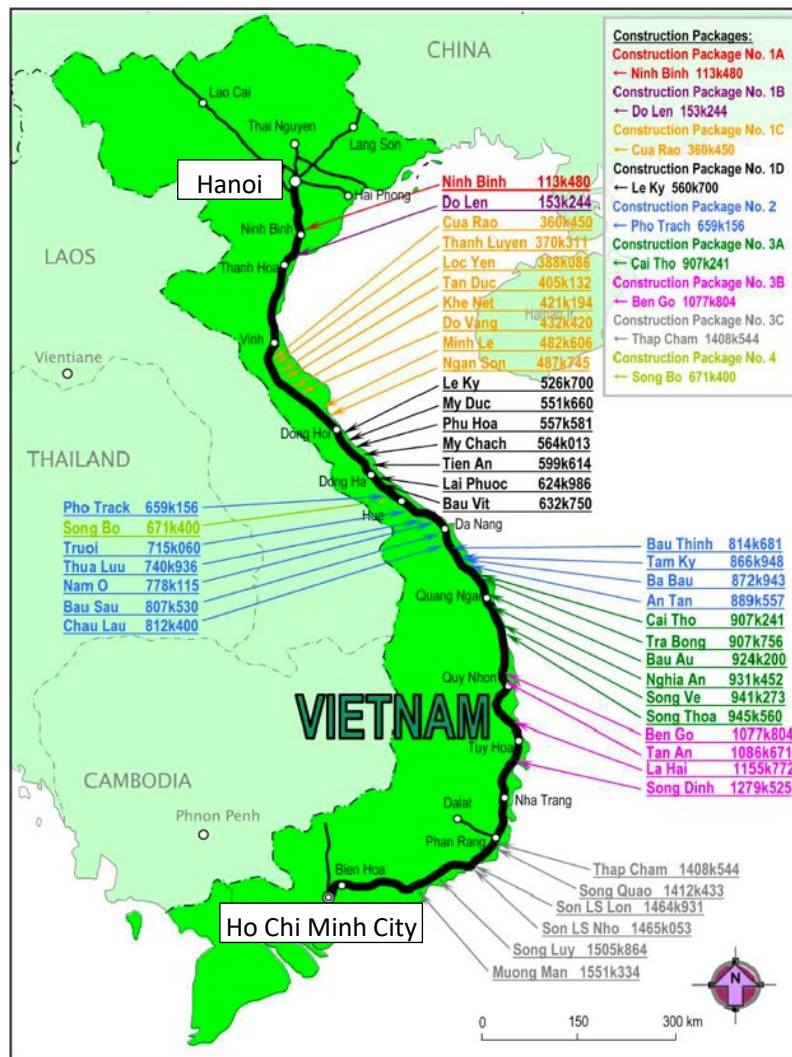
embankments in multiple bridges for cost reduction, and modifying the alignment in multiple bridges, thereby shortening the extension of track repairs, etc.), as well as some design changes at the time of the Phase 3 appraisal (such as canceling the construction of a new north abutment for the Tan Duc bridge for cost reduction and utilizing the existing one, and reevaluating and canceling the necessity of some ancillary facilities, etc.). All of these changes were concurred as non-issues by JICA. As will be discussed later, the total project cost had significantly increased; therefore, the scope revisions aimed at cost reduction are considered to be reasonable responses.

Table 1: Planned and actual results of civil works

	Plan at Phase 2 Appraisal	Result
Replacement of 44 bridges	Without alignment changes: 36 bridges With alignment changes: 8 bridges	Without alignment changes: 36 bridges With alignment changes: 8 bridges
Construction of tracks	Without alignment changes: 11.8 km With alignment changes: 31.738 km	Without alignment changes: 15.247 km With alignment changes: 29.832 km
Construction of ancillary facilities	Level crossings: 25 locations Level crossing automatic warning systems: 9 units Level crossing barriers: 13 units Underpasses: 41 locations South road bridge at Ninh Binh Bridge Ninh Binh Station and tracks	Level crossings: 21 locations Level crossing automatic warning systems: 10 units Level crossing barriers: 9 units Underpasses: 41 locations South road bridge at Ninh Binh Bridge Ninh Binh Station and tracks

Source: Materials provided by JICA, materials provided by the executing agency

The civil works contract packages were more subdivided as compared to the initial appraisal plan. Originally, the appraisal plan included procurement for four packages (Packages 1-4), but due to the large scope of work per package leading to unsuccessful bidding, they were divided into nine packages (Packages 1A-1D, Package 2, Packages 3A-3C, Package 4). Along with one package for equipment procurement, a total of 10 packages were procured.



Source: Materials provided by JICA

Figure 2: Bridges targeted in this project



Image 2: Thap Cham Bridge and its side road in Ninh Thuan Province. The bridge used Japanese technology such as directly fastened track.
(source: Photographed by the ex-post evaluator)



Image 3: Improved level crossing (ancillary facility of Song Quao Bridge in Ninh Thuan Province)
(source: Photographed by the ex-post evaluator)

The consulting services consisted of Consulting Service 1 and Consulting Service 2, as shown in the table below. The scope of work was as planned, and the volume of work increased due to unsuccessful bidding, package division, and extension of the construction period.

Table 2: Outline of the consulting services

	Scope of Work	Work Volume
Consulting Service 1	- Detailed design (for 44 bridges) - Pre-qualification (P/Q) and bidding assistance and construction supervision for civil works (for 17 bridges between Hanoi and Hue) - Review of the resettlement plan, assistance in its implementation, assessment and implementation of livelihood recovery measures as needed, and monitoring - Technical support for environmental measures (conducting detailed Environmental Impact Assessments (EIA), monitoring) - Capacity-building support for O&M of bridges and tracks - Formulation of O&M plans for bridges and tracks	Planned: 1,516 person-months Actual: 1,698.9 person-months
Consulting Service 2	- P/Q and bidding assistance and construction supervision for civil works (for 27 bridges between Hue and Ho Chi Minh City) - P/Q and bidding assistance for the procurement of O&M equipment	Planned: 942 person-months Actual: 1,255.23 person-months

Source: Materials provided by JICA, interviews with the consultants

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 Phase 2 appraisal was 23,868 million yen (of which the ODA Loan was 11,945 million yen for the amount paid in foreign currency and 8,014 million yen for the amount paid in local currency, for a total of 19,959 million yen). The actual amount of the total project cost was 34,606 million yen (of which the ODA Loan was 13,970 million yen paid in foreign currency and 18,171 million yen paid in local currency, for a total of 32,141 million yen), which exceeded the plan (145% against the plan⁸).

Among the main reasons for the increase in project costs, factors unrelated to this project included the global surge in construction materials and fuel prices that occurred after the Phase 2 appraisal in November 2006. Factors within the project were the need for measures against softer soil than anticipated at some sites, and the subdivision of construction packages due to unsuccessful bidding. The Vietnamese government addressed these issues as much as possible through its own funds, but an additional loan was still needed for the remaining shortfall, leading to the implementation of Phase 3.

⁸ For reference, if the planned amount of 210 million yen for the scope that was canceled for cost reduction is excluded from the planned amount, the ratio to the plan is 146%.

The Vietnamese side explained at the time of the Phase 3 appraisal that the breakdown of the additional project costs was as follows: 65% for addressing the rise in prices of construction materials and fuel, as well as labor costs;⁹ 26% for changes such as the subdivision of packages; and 9% for additional measures against soft soil conditions. In this context, the increase in project costs was discussed based on an analysis of the additional expenses needed beyond Phase 2, as well as considering the Viet Nam side's own efforts to mitigate these costs. Given these factors, the increase in project costs seems unavoidable. Additionally, during the appraisal for Phase 3, the total project cost was estimated to be 40,699 million yen, which was over 170% of the plan at the time of the Phase 2 appraisal. However, due to efforts to reduce costs, the actual figure was kept at 145%, as mentioned above, which is commendable.

3.2.2.2 Project Period

The project period for this project was defined as the period from the signing of the loan agreement to the end of the guarantee period (one year after the completion of construction work). According to the plan at the time of the Phase 2 appraisal, this was expected to be from March 2004 (the date of the Phase 1 loan agreement) to December 2012, a total of 106 months. By contrast, the actual period was from March 2004 to November 2017, a total of 165 months, significantly exceeding the initial plan (156% of the plan).

The delay was attributed to design changes, unsuccessful bidding, and the subdivision of construction packages, which resulted in delays across various stages of the project. However, as shown in the table below, some construction packages included bridges that were replaced relatively early, in years such as 2012 and 2013. Some bridges even became operational in 2011.

Table 3: Construction period for each construction package

Construction Package	Number of Target Bridges	Plan at Phase 2 Appraisal	Result
CP1A	1	April 2009-September 2011	May 2012-October 2015
CP1B	1		May 2011-July 2013
CP1C	8		July 2011-January 2014
CP1D	7		December 2011-February 2014
CP2	10	July 2009-December 2011	May 2010-October 2012
CP3A	6	July 2009-December 2011	December 2013-December 2015
CP3B	4		February 2014-August 2016
CP3C	6		February 2014-November 2016
CP4	1	July 2009-December 2011	February 2013-September 2015

Source: Materials provided by JICA, materials provided by the executing agency

Note: CP stands for Construction Package.

⁹ This price surge is not considered to be severe enough to be regarded as an "external factor," defined as a "severe economic crisis such as hyperinflation" that could be taken into account in the sub-rating for efficiency. Therefore, the sub-rating was based on the "145% of the plan" mentioned in the main text. For reference, if one were to consider the price surge as an external factor and subtract the portion attributable to this factor (65%) from the additional project costs, the resulting figure compared to the plan would be 113%, slightly exceeding the plan.

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

The Economic Internal Rates of Return (EIRR) calculated at the Phase 2 and Phase 3 appraisals were 11.5% and 8.0%,¹⁰ respectively. The project life was set at 40 years, and the costs included project expenses (excluding taxes) as well as O&M costs. The benefits accounted for the reduction in travel and transportation time for passengers and freight, as well as reduced maintenance costs. Using the same assumptions for the ex-post evaluation and substituting the actual figures for project costs and transportation volumes, the recalculated EIRR was 0.7%. The reason for the lower value compared to the appraisal estimates is believed to be that the actual project costs were higher, and the transportation volumes of passengers and freight, which serve as the basis for benefit calculations, were lower than initially anticipated.

The Financial Internal Rate of Return (FIRR) was not calculated during the appraisal because subsidies were being provided to Vietnam Railways (VNR), the entity responsible for railway operations, by the Vietnamese government. It was not recalculated during the ex-post evaluation due to the same circumstances.

Therefore, efficiency of the project is low.

3.3 Effectiveness and Impacts¹¹ (Rating: ③)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

The operation and effect indicators set at the time of the appraisals for this project were: 1) the annual railway transport volume between Hanoi and Ho Chi Minh City, and 2) the travel time between Hanoi and Ho Chi Minh City. Among the project objectives, “to ensure the safety of rail service, shorten passenger and freight transport time, and boost transportation volume,” Indicator 1) can be categorized as an effect indicator for measuring the increase in transport volume, and Indicator 2) as an effect indicator for measuring the shortening of transport time for passengers and goods. On the other hand, the main outcome of this project is considered to be “ensuring the safety of rail service.” This is mentioned in the project name and as the first item in the project objectives. It also logically has a direct causal relationship with the project’s output. This understanding is shared by the Vietnamese executing and related agencies. However, no indicators related to this particular outcome had been set. Therefore, this evaluation examined 3) the speed limits of the 44 target bridges and 4) the number of railway accidents as supplementary indicators (effect indicators). The following describes the

¹⁰ The EIRR calculated at the time of the Phase 3 appraisal was 10.5%. However, this calculation had set the starting point of the project life as the planned year of operation commencement, which was 2016. When recalculating the EIRR during the ex-post evaluation, the starting point for the project life was revised to be the year of the Phase 1 loan agreement signing, which was 2004, resulting in an EIRR of 8.0%.

¹¹ When providing the sub-rating, Effectiveness and Impacts are to be considered together.

achievement status of each: 1) was achieved to a limited extent, 2) was substantially achieved to a large extent, and 3) and 4) were fully achieved.

1) Annual railway transport volume between Hanoi and Ho Chi Minh City

The achievement level for railway transport volume for the target year (2018) was limited, with 42% based on the number of passengers, 53% based on passenger-km, 20% based on tonnage, and 48% based on ton-km, averaging 41%. The volume of transport continued to decline in 2019, and in 2020 and 2021, it decreased significantly, especially in passenger transport, due to the reduction in the number of train operations caused by the impact of the COVID-19 pandemic. The factors for not achieving the targets include setting high target values compared to the actual demand for rail transport (see “3.1.1.3 Appropriateness of Project Plan and Approach”), a rapid increase in air transport and a change in preferences for long-distance rail travel for passengers (according to VNR, sleeper cars with private compartments have become more popular than seat cars, reducing the capacity per train), and a rapid increase in road transport for freight.

In other words, the operation of the outputs from this project is being sustained, but the situation is such that it has not reached the level anticipated in terms of quantity. It should also be noted that although not reflected in these indicators, the project has upgraded bridges and tracks, increased load-bearing capacity, made it possible to transport passengers and freight without reducing speed on bridges, and reduced risk of operational restrictions due to bridge deterioration. Therefore, it can be said that the project has enhanced latent transport capacity.

Table 4: Annual railway transport volume between Hanoi and Ho Chi Minh City
(operation and effect indicators)

	Baseline value	Target value	Actual value					
	2005	2018 2 Years After Completion	2016 Completion Year	2018 2 Years After Completion	2019 3 Years After Completion	2020 4 Years After Completion	2021 5 Years After Completion	2022 6 Years After Completion
Passenger Transport Volume (Thousand People/Year)	6,671	16,500	6,984	6,873	6,278	2,951	1,116	2,310
Passenger Transport Volume (Million Passenger-km/Year)	3,889	6,205	3,075	3,314	2,965	1,437	560	1,168
Freight Transport Volume (Thousand Tons/Year)	2,915	12,801	2,213	2,519	2,221	2,157	2,204	2,663
Freight Transport Volume (Million Ton-km/Year)	1,650	6,128	2,356	2,958	2,722	2,689	2,782	3,497

Source: Materials provided by JICA, materials provided by the executing agency

Note: The target values are those set at the time of the Phase 3 appraisal. For both target and actual values, the term “completion (year)” refers to the year of construction completion (i.e., one year prior to the end of the guarantee period), not the year when the guarantee period ends, which is used for evaluating the efficiency of the project duration. The same applies to the tables for other indicators that follow.

2) Travel time between Hanoi and Ho Chi Minh City

For the target year (2018), the travel time for passenger trains did not decrease but rather increased, whereas for freight trains, the travel time was significantly reduced, exceeding the

target. Therefore, if looking solely at these numbers, the achievement is partial. However, according to the executing agency, the baseline value of 29.5 hours for passenger trains was the travel time for a specific express train, and the average travel time was around 35-36 hours. The average travel time after 2018 has been 31-32 hours, indicating a reduction of approximately 4 hours compared to before the project. Thus, considering the significant reduction in travel time for freight trains from 60 hours to 38-39 hours, it can be said that the reduction in travel time has been largely achieved in practical terms.

The factors determining travel time are not solely the speed of the train but also include the number of stops, train passing, and the impact of construction work (the PMU-Rail continues to renovate bridges and tracks with government funding even after this project), among other things. Particularly for passenger trains, VNR places emphasis on transporting more passengers, and the increase in travel time in 2022 was explained to be partly due to the addition of more stops. Furthermore, the aim is to reduce the travel time for all trains, not just specific ones, and as of the time of the ex-post evaluation, there were no passenger trains operating at 29.5 hours. Considering these factors, along with the increased speed limits on bridges (discussed in the following section), this indicator may not directly reflect the impact of bridge replacements, but it can be said that this project has contributed to the reduction of travel time.

Table 5: Travel time between Hanoi and Ho Chi Minh City (effect indicators)

	Baseline value	Target value	Actual value					
	2005	2018 2 Years After Completion	2016 Completion Year	2018 2 Years After Completion	2019 3 Years After Completion	2020 4 Years After Completion	2021 5 Years After Completion	2022 6 Years After Completion
Passenger Trains (Hour)	29.5 (Average: 35.5)	24	31	31	31	31	31	32
Freight Trains (Hour)	60	54	38	38	38	38	38	39

Source: Materials provided by JICA, materials provided by the executing agency

3) Speed limits of the 44 target bridges

For the outcome “ensuring the safety of rail service,” changes in speed limits were checked as supplementary indicators at the effect indicator level for all target bridges. First, according to the executing agency, all speed restrictions imposed on the target bridges for safe operation have been lifted. This suggests that the safety of trains operating at regular speeds has been secured. Second, the speed limits for sections that include the 44 bridges (totaling approximately 545 km, which accounts for about 32% of the railway extension between Hanoi and Ho Chi Minh City) exceed the planned speed limits for the target bridges. Although such speed sections include tracks and bridges that are not part of this project, before the project, trains had to reduce their speed to an average of around 30 km/h on the target bridges, creating a bottleneck in those sections. This issue has been resolved by the project, allowing trains to

pass at an average speed of 75 km/h, which can be attributed to the project's effectiveness.¹² Additionally, comments from the regional management maintenance companies (RMMCs, subsidiaries of VNR) indicated that the project has made the track alignment more linear,¹³ allowing for higher speeds.

Table 6: Speed limits of the 44 target bridges
(supplementary indicators at the effect indicator level)

	Baseline value	Target value	Actual value
	2003	Post-project	2022 Post-project
Passenger Trains (km/h)	Average: 34	Average: 70	No speed restrictions on bridges Speed limit for a section including each bridge: 30-100 Average: 75
Freight Trains (km/h)	Average: 30	Average: 59	No speed restrictions on bridges Speed limit for a section including each bridge: 30-100 Average: 75

Source: Materials provided by JICA, materials provided by the executing agency

4) Number of railway accidents

As another supplementary indicator at the effect indicator level for the outcome “ensuring the safety of rail service,” the number of railway accidents was examined. According to data from VNR, the number of accidents on the North-South Railway Line was 457 in 2005, 174 in 2019, and 160 in 2022, showing a consistent decrease in both the number of incidents and casualties. The number of accidents on the bridges targeted by this project has been zero both before and after the project. In terms of the effects of bridge replacement, it can be considered effective in the sense that no accidents have occurred even when trains operate at regular speeds, thus ensuring the safety of train operations.

While data on the number of accidents by cause were not available, VNR indicated that most of them occurred at level crossings and intersections. Feedback from multiple RMMCs confirmed that improvements to level crossings and the construction of grade-separated intersections undertaken by this project have contributed to the reduction in accidents. Additionally, there was a case where the slope protection implemented alongside bridge construction prevented landslides, thereby mitigating risks to railway operations, which can be cited as another positive effect.

¹² The ex-post evaluator rode a section of the North-South Railway Line (from Thap Cham Station to Hue Station, covering 720 km) during the on-site survey on December 20, 2022. Using a mobile phone app for a simple speed measurement, the evaluator confirmed that the train was running at speeds generally close to the speed limits on and around the bridges targeted by this project.

¹³ In this project, the track alignment before and after certain bridges was changed as needed for the bridge replacements. During this process, curves with a radius of less than 200 meters were improved to have a radius of 200 meters or more, in accordance with Vietnamese regulations.

3.3.1.2 Qualitative Effects (Other Effects)

The qualitative effects expected at the time of the appraisals were 1) the improvement in the safety of the Hanoi-HCMC Railway Line and 2) the development of industries in the areas along the line due to enhanced transport capacity. Considering the content of each, 1) was evaluated for its effectiveness (in this section), and 2) was categorized as a point of confirmation in “3.3.2.1 Intended Impacts.” As for 1), the manifestation of effects has been confirmed as described above.

3.3.2 Impacts

3.3.2.1 Intended Impacts

The impact “contributing to the sustainable economic growth of the areas along the [North-South Railway] Line,” which was intended at the time of the appraisals, could not be confirmed as an impact of the bridge replacements.¹⁴ Among the People’s Committees or DOTs of the four provinces/cities along the line that were interviewed (from north to south: Ninh Binh City, Da Nang City, Hue City, and Ninh Thuan Province), only the People’s Committee of Ninh Binh City, where a new station building had been constructed (refer to “3.3.2.2 Other Positive and Negative Impacts” for details), recognized that this project had a direct impact on the industrial and economic development of the area. Such a lack of impact manifestation was explained by them as being due to the inconvenience of connections to roads and ports (many railway stations lack cargo loading and unloading areas, and truck transport between ports and railway stations is more expensive than truck transport to the destination). However, both Da Nang City and Ninh Thuan Province are planning to construct railway feeder lines to Lien Chieu Port and Ca Na Port, respectively; therefore, the potential for future impact is anticipated.

3.3.2.2 Other Positive and Negative Impacts

1) Impacts on the Environment

This project was classified as Category B based on the *JBIC Environmental Guidelines for ODA Loans* (October 1999), as it was a project in the railway sector project that does not belong to Category A.

Regarding environmental permits, the Preliminary Environmental Impact Assessment (EIA) reports for this project had been approved by the Ministry of Natural Resources and Environment (MONRE; formerly known as the Ministry of Science, Technology and Environment) in February 2002 and October 2003, respectively. The Detailed EIA report had also been approved by the MONRE in February 2010. For pollution control measures, the

¹⁴ The evaluator obtained some data on the local GDP, investment amounts, and the number of industrial parks in the areas along the line, and confirmed that they are generally showing an increasing trend. However, taking into account the comments from the local governments as indicated in the main text, the evaluator determined that there is no connection with this project and chose not to use these metrics in the evaluation.

project planned to carry out noise and vibration mitigation, river pollution control through tree planting and the installation of noise barriers, and proper waste disposal during construction. These measures were addressed by the contractors through the formulation and implementation of an environmental management plan in accordance with the EIA, Vietnamese domestic laws, and the aforementioned JBIC's *Guidelines* (1999). The executing agency has reported that there were no negative impacts. For monitoring during construction, noise, vibration, air quality, and water quality were monitored by the consultant, who employed specialists and local consultants to carry out the work.

The specific status of environmental monitoring after the completion of the project could not be ascertained. However, the executing agency, through designing and implementing improvement works in adjacent sections or the like, and VNR, through conducting inspection and maintenance of the target facilities, have been monitoring the natural environment of the target sections. Based on these results, they have reported that there has been no negative impact on the environment post-completion. However, although not directly related to the impact of the facilities constructed in this project, it was found that the project has triggered a waste disposal issue in Ninh Binh City, Ninh Binh Province. Specifically, due to the track changes made by this project, an unmanaged area has emerged around the safety buffer zone alongside the railway, as the boundary between the city's land and VNR's land has not been clearly agreed on by both parties. Waste has been dumped in this area, and according to the city, no measures can be taken because the city's management responsibility is not clearly defined. Additionally, it was observed that waste has been discarded and not cleaned up under the road bridge constructed as part of this project. According to the city, they are unable to manage the area because the land has not yet been transferred from VNR. Additionally, it was observed that some construction waste from this project has also been left unattended. VNR's perspective is that the land boundaries have already been defined in accordance with railway laws, land laws, and other relevant regulations. They have instructed the responsible RMMC (a subsidiary) for the section in question to clean the area, but this has not yet been fully implemented. Furthermore, VNR admitted that they have not reached an agreement with the city regarding the division of management responsibilities for the same boundaries.

2) Resettlement and Land Acquisition

For this project, due to the alignment changes and the construction of grade-separated crossings, land acquisition for 44 bridges covering a total of 73 ha¹⁵ and involuntary resettlement of 234 households for 22 bridges occurred. In the provinces where land acquisition and resettlement occurred, Compensation Committees established at the provincial and sub-provincial administrative levels carried out detailed socioeconomic surveys of the affected residents, explained the acquisition process to them, assessed the assets eligible for compensation, calculated the compensation amounts, and made the payments, all while

¹⁵ In addition to this, approximately 53 ha were acquired for temporary use during the implementation of the project.

collaborating with the PMU-Rail. For the relocated residents, resettlement sites were prepared based on the Resettlement Action Plan, and essential infrastructure, electricity, water supply, and roads were developed. Support for lifestyle and livelihood was provided not only to those who relocated to the sites prepared by the project but also to affected residents who chose other locations. Resettlement monitoring was carried out by the consultant, who employed specialists and local consultants for the task.

Delays in the provision of resettlement information from the PMU-Rail and in the development of infrastructure at the resettlement sites were reported at some sites, but these issues were resolved by the time of the Phase 3 appraisal. Due to changes in socio-economic conditions, as well as survey results and design changes during the detailed design phase, the area acquired and the number of affected households increased compared to the plan at the Phase 2 appraisal. However, according to the executing agency and the resettlement officials from the local governments visited, explanations about the project overview, compensation policy, and compensation levels were provided to all affected residents, and agreements were reached. Compensation was determined and paid based on Vietnamese domestic laws, and after the payments were made, it was reported that there were no complaints regarding land acquisition or resettlement.

From the interviews with the People's Committee of Ninh Binh City during the site visits (Ninh Binh Bridge and Ninh Binh Station site in Ninh Binh Province, where the most extensive resettlement of 140 households occurred), as well as from the resettlement monitoring reports at other sites, it was reported that the resettlement locations were close to the original lands and had high convenience. There was no need for residents to change their means of livelihood, which contributed to the smooth execution of land acquisition and resettlement.



Image 4: Resettlement site near Ninh Binh Station. All affected residents were relocated to this site, and 80% of them are reported to still reside in the same location as of the time of the ex-post evaluation. (source: Photographed by the ex-post evaluator)

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

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. According to the executing agency, no specific groups or individuals have been negatively affected.

4) Unintended Positive / Negative Impacts

The executing agency and related organizations cited the following positive secondary effects:

- Reduction in bridge maintenance costs. According to the PMU-Rail and RMMCs, the frequency of component replacement has decreased due to the use of directly fastened track (rails directly fastened to the stringers, eliminating the need for sleepers),¹⁶ the use of concrete sleepers (more durable than wooden ones), and the use of durable paint.
- Bridge construction that does not affect the operation of existing lines. According to the PMU-Rail, the replacement of bridges was smoothly carried out using the construction procedure (technology) proposed by the Japanese consultants, and there was no impact on the operation of existing lines. The technology learned is also being utilized in bridge replacements being carried out with Vietnamese budget post-project.
- Improvement in bridge aesthetics. According to the PMU-Rail and RMMCs, the use of high-quality Japanese steel allowed for a more slender and aesthetically pleasing upper structure.
- Improved convenience for residents through side roads and utilization of an existing bridge. Side roads constructed parallel to the tracks on each bridge (for pedestrians and motorcycles) and underpasses have made it easier for residents to get around. Additionally, at Ngan Son Bridge in Quang Binh Province, the existing bridge has been retained for use as a road bridge at the request of the local government. This has led to the emergence of new social and economic activities, such as the construction of buildings on the opposite bank of the river.
- Impact on Ninh Binh City. According to the city, the establishment of the new Ninh Binh Station through this project has made it easier for tourists to access attractions such as the Trang An Scenic Landscape Complex (a World Heritage site) by train. Additionally, the road bridge constructed over National Highway 1 as part of this project has eliminated the need for level crossings, thereby facilitating smoother road traffic. A provincial project connecting the national and provincial roads is also underway. Moreover, according to the station master at Ninh Binh Station, the newly established loading area and warehouse have made it easier to load and unload goods such as cement, automobiles, rice, fertilizers, and construction materials for transport between the station and Ho Chi Minh City. While data were not available, this can be cited as an example of promoting industrial and economic development through improved rail freight transport.

¹⁶ Due to the rapid deterioration of sleepers, they were first introduced in Viet Nam during the first phase of the preceding project, the Hanoi-Ho Chi Minh City Railway Bridge Rehabilitation Project, which was completed in December 2000.



Image 5: Gia Huu Bridge in Binh Dinh Province. Completed in 2021, the bridge was constructed using technology from this project and government funding after the project's completion. (source: Photographed by the ex-post evaluator)



Image 6: Newly constructed Ninh Binh Station and the freight warehouse (on the right). (source: Photographed by the ex-post evaluator)

Based on the above, this project has mostly achieved its objectives of ensuring the safety of rail service, shortening passenger and freight transport time, and boosting transportation volume. The safety of rail service, which is a particularly important and direct outcome, has been fully achieved. The anticipated impact of contributing to the sustainable economic growth of the regions along the line could not be fully confirmed, but numerous other positive impacts were observed. Therefore, 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” in the Vietnamese government’s transportation/railway policy at the time of the ex-post evaluation, the improvements to existing railway infrastructure, including the North-South Railway Line, are highlighted. Therefore, policies and systems for operation and maintenance are in place.

3.4.2 Institutional/Organizational Aspect

The operation and maintenance structure of this project is largely as anticipated at the time of the appraisals. The facilities completed under this project are owned by the state, and their operation and management are carried out by VNR. VNR has established eight regional maintenance management companies (RMMCs)¹⁷ for different railway segments, and the maintenance of the bridges and tracks, among other facilities developed through this project, is being carried out by these RMMCs on a shared basis. The maintenance equipment procured through this project is owned and managed by respective RMMCs. VNR was initially under the jurisdiction of the MOT, but this changed in 2018 with the establishment of the Commission for

¹⁷ At the time of the ex-post evaluation, the formal name for an RMMC is Railway Joint Stock Company, but for convenience it is referred to as an RMMC.

the Management of State Capital at Enterprises (CMSC), an agency responsible for overseeing all state-owned enterprises. VNR now falls under the purview of this commission. Additionally, the regulation and supervision of the railway sector, as well as the formulation of development policies, are carried out by the Vietnam Railway Authority (VNRA; formerly known as the Vietnam Railway Administration or VRA at the time of project implementation) under the MOT. The roles and responsibilities of these agencies are clearly defined.

The organizational structure of RMMCs is largely uniform across the companies, with personnel allocated to teams, sub-teams, and sections for each railway segment.¹⁸ The number of employees at the seven RMMCs visited varies depending on the distance each company is responsible for, ranging from approximately 170 to 590 people. Of these, the number of maintenance staff ranges from about 120 to 240. All RMMCs have allocated the necessary number of personnel for the companies' tasks and have responded that they are adequately staffed for operation and maintenance.

Thus, the system and structure for operation and maintenance are well-established.

3.4.3 Technical Aspect

Based on interviews with RMMCs, their technical level in formulating track maintenance plans, implementing maintenance systems, and using maintenance equipment is sufficient for the maintenance of the target bridges. Staff with the necessary qualifications and skills have been employed and undergo regular skill checks and training. Training includes on-the-job training as well as dispatch to VNR's training institution, the College of Railway Occupational Training, and invitations to instructors.

Some challenges have been observed in the maintenance of elements that utilize Japanese technology and products. For the maintenance of tracks and bridges, including those sections, the railway operating procedures set by the VNRA (MOT Decision 2320/QD-BGTVT, 2015), the basic technical standards 05:2022/VNRA, and the maintenance manuals created for this project are being referred to. However, the technical standards and maintenance manuals have not been formalized into the Vietnamese government's standard operating procedures, making them inexecutable during maintenance work. Additionally, multiple RMMCs commented that they were not informed about the procedures for the 10-year inspection and repainting of the arches. The integration of these essential technical documents into standard operating procedures is being addressed by the VNRA and VNR at the time of the ex-post evaluation.

The training planned at the time of the appraisals to strengthen the equipment maintenance management system was carried out as part of the project's training related to the maintenance of procured equipment. It was noted that the maintenance equipment provided by this project is simple; therefore, advanced skills are not required for its operation.

¹⁸ At Nghia Binh RMMC, which is responsible for the project bridges in Quang Ngai Province and Binh Dinh Province, a new system has been implemented. In this system, maintenance personnel are divided into safety staff and maintenance staff, who are then assigned to sub-teams and sections.

Thus, while there are some minor issues with the technical aspect of operation and maintenance, there is potential for resolution.

3.4.4 Financial Aspect

The operation and maintenance costs for the North-South Railway Line are allocated as anticipated at the time of the appraisals. The budget is distributed from the MOT to VNR, and then reallocated to RMMCs. Each RMMC submits a budget request to VNR for funding for the maintenance and repair of railway infrastructure. They receive maintenance budget allocations from the general revenue and a certain percentage of VNR's railway fare income.

Budget data was provided by three of the seven RMMCs visited. The annual budget received by RMMCs through VNR ranges from approximately 107 billion Vietnamese dong (VND) to 166 billion VND, with an average of around 128 billion VND. The maintenance budget per kilometer was 792 million VND.¹⁹ All seven RMMCs responded that the maintenance budget allocated to them covers only 50-65% of the required amount. However, they emphasized that the cost of materials needed to ensure safety is prioritized and secured. Additionally, if there are operational issues due to budget constraints, they report to VNR, which then reviews the situation and allocates emergency funding if necessary. Therefore, although the budget allocation is not sufficient, it can be said that the safe operation of the North-South Railway Line is not compromised.

Similar to the technical aspect mentioned earlier, there are issues with the maintenance budget for elements that utilize Japanese technology and products. Specifically, the maintenance budget is calculated based on the cost norms approved by the government, which, as of the time of the ex-post evaluation, follow the per-kilometer unit price stipulated in the *Cost Norms for the Maintenance Costs of National Railway Infrastructure* (MOT Decision 2291/QD-BGTVT) from 2010. However, according to both the VNRA and the visited RMMCs, there are no established costs for maintaining long rails, directly fastened tracks, paint, and resin-injected adjusting pads for rails introduced in this project, making it impossible to request a budget for these items. As of the time of the ex-post evaluation, safe operation has been maintained through the procurement of alternative products within the scope allowed by the existing cost norms. However, a revision of these cost norms will be necessary before more extensive maintenance becomes required in the future. Similar to the technical aspect, the VNRA and VNR are addressing these challenges.

Thus, while there are some minor issues with the financial aspect of operation and maintenance, there is potential for resolution.

¹⁹ In terms of the exchange rate as of December 2022 (1 VND = 0.005614 yen), the annual budget ranges from approximately 607 million yen to 931.9 million yen, with an average of around 718.6 million yen. The maintenance budget per kilometer stands at about 4.4 million JPY.

3.4.5 Environmental and Social Aspect

The operation of the 44 bridges has not resulted in any negative environmental or social impacts, and given the nature of this project, these are not points of particular concern. As for the issue of littering around the Ninh Binh Bridge and station area (as detailed in “3.3.2.2 Other Positive and Negative Impacts”), VNR has given cleaning instructions to on-site personnel, and Ninh Binh City has also taken certain measures, such as setting up a new waste collection points in the vicinity and encouraging private waste collectors to bring in garbage. There is no current trend of worsening conditions.

3.4.6 Preventative Measures to Risks

No specific risks are found.

3.4.7 Status of Operation and Maintenance

All target bridges and ancillary facilities undergo regular inspections and maintenance in accordance with Vietnamese standard operating procedures. Based on responses from VNR and RMMCs, as well as visual inspections at some sites, most facilities are in good condition. However, some issues were observed as listed below. In each case, measures such as part replacement and the use of alternative items have been taken, ensuring that safe operations are maintained.

- Deterioration of resin-infused rail pads. In most of the bridges built under this project, which employed directly fastened tracks, the resin in adjusting pads placed under rails has deteriorated, making it difficult to maintain the height of the rails. Although the manufacturer recommended replacement after 10 years, deterioration began around two years after completion. Rubber pads and steel plates are being used as alternative items. Re-injecting the resin is challenging due to the lack of necessary equipment and the fact that the MOT does not approve budget requests for this purpose, as it is not listed in the cost norms.
- Difficulty in procuring rail joint components. The replacement parts for the compromise rails used at the connection points between the Japanese-made rails employed in this project and the rails from other countries used in other sections (which have different standards) are custom-made for each location. However, manufacturing these parts domestically is challenging, causing some concerns for future replacements.
- Rail wear. There are locations where rail replacement is necessary due to significant wear occurring much earlier than the expected life span. According to the consultants, the causes of wear vary and require individual measurements and investigations. Importing rails from Japan is also challenging for individual RMMCs due to the small lot sizes required, so rails from other countries are being used as replacements.

- Deterioration of the roofs at Ninh Binh Station. The plastic roofs have deteriorated due to the climate (high heat and humidity, storms, etc.) and have also been damaged by hail. As a result, they are being gradually replaced with more durable metal roofs (replacements are being made little by little due to budget constraints). The original design incorporated natural lighting, but the switch to metal roofs has necessitated the installation of new lighting.

In addition, there were issues such as missing contact information for suppliers and lost maintenance manuals in some RMMCs, but these can be immediately addressed by the PMU-Rail and VNR. Overall, the condition of the maintenance equipment is generally good.

Thus, while there are some challenges in the status of operation and maintenance, the overall condition is good.

Slight issues have been observed in the technical, financial, and environmental and social aspects; 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 ensure the safety of rail service, shorten passenger and freight transport time, and boost transportation volume by replacing 44 severely age-worn bridges on the rail line between Hanoi and Ho Chi Minh City (the North-South Railway Line, total length: 1,700 km). The project plan aligns with Viet Nam's development policy and needs, as well as Japan's aid policy, making its relevance and coherence high. As a result of the project implementation, speed restrictions on the bridges were lifted, allowing trains to run safely at normal speeds. Additionally, improvements to level crossings and grade separations have led to a decrease in accidents at railway-road intersections. Although the volume of railway transportation fell short of expectations due to the rapid development of air and road transport, the project objective was largely achieved, as the key outcome of ensuring safety was fully met. The anticipated impact of contributing to sustainable economic growth in the regions along the line could not be confirmed. However, the acquisition and utilization of Japanese technology and the improvement of convenience for residents through the construction of side roads and the utilization of existing bridges were confirmed. Therefore, the effectiveness and impacts are high. Efficiency is low because the project cost exceeded the plan and the project period significantly exceeded the plan. Regarding the operation and maintenance of the project, there are some technical and financial issues due to the lack of formalization of standard operating procedures in Viet Nam for the maintenance of parts using Japanese technology and products. However, there are prospects for addressing these issues, and other aspects are mostly good, making the sustainability high.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

- 1) The MOT is recommended to advance the approval process for the technical standards created by the VNRA/VNR and the maintenance manuals developed for this project, and to incorporate said manuals into the official maintenance guidelines. By doing so, it is desirable to secure the maintenance budget for the Japanese technology and products introduced in this project, ensuring that maintenance is carried out reliably.
- 2) VNR is recommended to reexamine the procurement methods for maintenance materials and parts for the bridges constructed under this project. The aim is to choose methods that are highly feasible, addressing the collective needs of multiple RMMCs, and appropriate to the current situation.
- 3) It is recommended that the PMU-Rail and VNR provide RMMCs with contact information for Japanese suppliers.

4.2.2 Recommendations to JICA

JICA could consider providing technical assistance for the maintenance capabilities of the 44 bridges under this project and the 19 bridges from the preceding project that utilize Japanese technology and products, if requested by the Vietnamese side. This could include technical cooperation specifically for repainting and inspection of the superstructure, and may encompass on-the-job training and equipment provision as needed.

4.3 Lessons Learned

1) Design with a focus on medium- to long-term maintenance when utilizing Japanese technology and products

The resin in the adjusting pads for the tracks and the plastic roofing material for the station building have deteriorated and broken just a few years after completion. Some rails have also worn out faster than their expected life span and require replacement. The project's sustainability could have been further enhanced if the design had considered the potential for accelerated deterioration due to Viet Nam's climate and usage conditions, as well as the medium- to long-term availability of replacement parts when selecting materials.

2) Ensured provision of supplier information to operation and maintenance organizations

In many of the RMMCs responsible for the maintenance of the project, the provision of information about Japanese product suppliers has not been ensured, and such information has not been fully retained even by the executing agency, the PMU-Rail. Especially when the executing

agency and the operation and maintenance organization are different, it is desirable for the executing agency to ensure that supplier information reliably reaches the end-level operation and maintenance organizations. Additionally, the executing agency itself should store the information so that it can respond to future inquiries.

3) Appropriate setting of operation and effect indicators for dispersed railway bridge replacements

The operation and effect indicators set for this project (transport volume and travel time for the entire North-South Railway Line) were not highly direct measures of the immediate effects of the project to improve 44 bridges and ancillary facilities out of approximately 1,500 bridges along the entire line. These indicators are also subject to various external factors. More direct measurement of the effects would be possible by adding indicators such as speed limits and passing time in the same speed sections that include the target bridges, as was done as supplementary indicators in this evaluation. These indicators can also serve to measure whether safety was ensured, as they demonstrate the ability to operate trains at higher speeds while maintaining safety. Furthermore, if the objective is to increase the overall transport volume and reduce travel time on the entire line, it would be desirable to set indicators and target values after considering and clarifying what external conditions exist outside of this project, such as the state and outlook of other modes of transportation and train operation policies.

The anticipated impact of this project (contribution to the sustainable economic growth of the areas along the railway line) has not been visibly manifested. While the safety of the North-South Railway Line operation has been assuredly improved through this project, multiple stakeholders have pointed out that the connectivity between the railway and roads or ports has not been adequately established. As the sole example, comments were heard that, while no data was obtained, the convenience for passengers and freight has increased at Ninh Binh Station, where a new station building, loading area, and warehouse were constructed. If the aim of the railway bridge improvement project is to contribute to the economic growth of the areas along the line, it is desirable to consider and specify what external conditions exist (such as the development of connectivity with other modes of transportation).

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. From the project documents, it appears that all necessary procedures were carried out. The implementation of an additional loan appears to have enabled the completion of the project, and no particular issues were observed in the series of actions taken for that purpose.

The evaluation also deems that the project had an adequate system of supervision, which took into consideration the changes in the project environment. There was a need to adapt to the fragmentation of procurement packages and to change the executing agency from VNR to the MOT due to the shift of VNR out from under the MOT. It appears that the procedures for these changes were carried out appropriately.

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. Records of necessary communications are documented in the project files. The responsiveness of the JICA overseas office staff to this ex-post evaluation further indicates that close communication was maintained with the MOT and VNR.

5.2 Additionality

The added value of this project lies in the introduction of Japanese railway infrastructure and bridge replacement technologies, as well as providing support for railway infrastructure at a time when Viet Nam particularly needed it. Regarding the latter, comments from the executing agency indicated that while support from other donors primarily focused on the development of railway ancillary facilities, receiving support from Japan for the much-needed bridge replacements was crucial. Although the share of railway transportation in Viet Nam is very small compared to other modes of transport, the importance of maintaining safe operations is high, making this a meaningful project.

(End)

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
1. Project Outputs 1) Civil Works and Equipment Procurement	Replacement of bridges: 44 bridges Construction of tracks: Approximately 44 km Construction of ancillary facilities: 25 level crossings, 9 level crossing automatic warning systems, 13 level crossing barriers, 41 underpasses, 1 road bridge, 1 station and tracks, procurement of maintenance equipment	Replacement of bridges: As planned Construction of tracks: Approximately 45 km Construction of ancillary facilities: 21 level crossings, 10 level crossing automatic warning systems, 9 level crossing barriers, 41 underpasses, 1 road bridge, 1 station and tracks, procurement of maintenance equipment
2) Consulting Services	Consulting Service 1: Total 1,516 person-months for detailed design for 44 bridges, P/Q and bidding assistance and construction supervision for 17 bridges, support for the resettlement plan, and support for environmental measures Consulting Service 2: Total 942 person-months for P/Q and bidding assistance and construction supervision for 27 bridges and P/Q and bidding assistance for the procurement of maintenance equipment	Consulting Service 1: Total 1,698.9 person-months for the same scope of work as planned Consulting Service 2: Total 1,255.23 person-months for the same scope of work as planned
2. Project Period	March 2004-December 2012 (106 months)	March 2004-November 2017 (165 months)
3. Project Cost Amount Paid in Foreign Currency Amount Paid in Local Currency Total ODA Loan portion Exchange Rate	(Plan at Phase 2 appraisal) 11,945 million yen 11,923 million yen (1,637,775 million VND) 23,868 million yen 19,959 million yen 1VND = 0.00728 yen (As of November 2006)	13,970 million yen 20,636 million yen (3,752,000 million VND) 34,606 million yen 32,141 million yen 1VND = 0.0055 yen (Average for 2005-2016)
4. Final Disbursement	July 2020	

Republic of Iraq

FY2022 Ex-Post Evaluation of Japanese ODA Loan

“Communications Network Development Project for Major Cities”

External Evaluator: Masami Tomita, i2i Communication, Ltd.

0. Summary

This project aimed to improve the telecommunications environment, which constitutes essential industrial infrastructure, by developing a subscriber network in Iraq’s major city (Baghdad). The relevance and coherence of the project are high, as the project plan is consistent with Iraq’s development plans and needs and Japan’s ODA policy, and the project plan, approach, etc., also appear appropriate. The efficiency of the project is moderately low because, while the project cost was within the plan, the project period significantly exceeded the plan. Considering that the number of fixed broadband Internet service subscribers in the project area has been growing faster than the forecasted demand, that there has been no significant backlog in the provision of the service, and that the service has been well received by its users, the project has contributed improving the telecommunication environment in the city. The project has also contributed to the country’s economic and social reconstruction as it has helped to create jobs in the Iraqi telecommunications sector and is promoting the country’s telecommunications equipment manufacturing industry. Therefore, the effectiveness and impacts of the project are high. The sustainability of the project effects is high because, while there are some minor problems with respect to the status of operation and maintenance, no issues have been observed overall in the policy/system, institutional/organizational, technical, and financial aspects and countermeasures to risks, etc.

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

1. Project Description



Project location



Photo 1: Telecommunication equipment storage cabinet at the Al-Mamoon site
(Source: ex-post evaluation team¹)

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

1.1 Background

In Iraq, the penetration rate of fixed telephone lines had stagnated at around 5-6% before 1990. However, the destruction and deterioration of the telecommunications infrastructure due to the 1991 Gulf War and subsequent economic sanctions were so severe that it dropped to 4.0% in 2002. After the end of the Iraq War, the core transmission network was restored and developed through reconstruction assistance and the Iraqi government's own funds, and a total of 18 main switching stations were set up to link the core transmission network between major cities throughout Iraq. As part of this reconstruction assistance, the Japanese government provided the "Project for Improvement of Trunk Communications Network" and the "Project for Improvement of Transit Switches" (both in 2004) through emergency grant aid. The World Bank also assisted the development of a microwave transmission system for three main routes as part of the "First Private Sector Development Project" (2005-2008). However, the development of the subscriber networks connecting the core transmission network and users was slow, with the penetration rate of fixed telephone lines in 2009 remaining at 6.1%, lower than that of neighboring Jordan (approximately 12%). The number of fixed broadband Internet subscribers in 2011 was only 300 lines. In addition, at the time of the project appraisal, the traditional Public Switched Telephone Network (hereinafter referred to as "PSTN")² was rapidly transitioning across the world to the Next Generation Network (hereinafter referred to as "NGN")³ based on the Internet Protocol (hereinafter referred to as "IP")⁴ technology. As a result, telecommunications equipment manufacturers were reducing the production of conventional circuit-switching equipment and shifting to the production of IP-related products. This made it more difficult to maintain the existing PSTN, as repair parts for existing telecommunications facilities became less available. Therefore, Iraq not only needed to restore the existing infrastructure but also build an NGN and transition from the provision of telephone-based services to the provision of multimedia services, including voice and data.

1.2 Project Outline

This project aims to improve the telecommunications environment, which constitutes essential industrial infrastructure, by developing a subscriber network in a major city in Iraq, thereby contributing to the country's economic and social reconstruction.

Loan Approved Amount / Disbursed Amount	11,674 million yen / 11,642 million yen
Exchange of Notes Date / Loan Agreement Signing Date	May 2012 / October 2012

² The PSTN refers to the public switched telephone network that enables voice calls through circuit-switching equipment.

³ The basic features of the NGN include the transmission based on IP technology, separation of packet forwarding and service control functions, and an open face with unrestricted access.

⁴ IP refers to a communication protocol for data transmission over the Internet.

Terms and Conditions	Interest Rate	0.65%
	Repayment Period (Grace period	40 years 10 years)
	Conditions for Procurement	General Untied
Borrower / Executing Agency	The Government of the Republic of Iraq / The Ministry of Communications (MOC)	
Project Completion	December 2021	
Target Area	Baghdad City, Basrah City, Mosul City ⁵	
Main Contractor (Over 1 billion yen)	Telefonaktiebolaget LM Ericsson (Sweden)	
Main Consultant (Over 100 million yen)	Nippon Koei Co., Ltd. (Japan)	
Related Studies (Feasibility Studies, etc.)	Preparatory Survey (2011)	
Related Projects	[Grant Aid] • The Project for Improvement of Trunk Communications Network (October 2004) • The Project for Improvement of Transit Switches (October 2004) [The World Bank] • The First Private Sector Development Project (2005-2008)	

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: October 2022-January 2024

Duration of the Field Study: February 12-February 16, 2023, July 16-July 20, 2023 (meetings with executing agency representatives and field study assistants in the third country (Jordan)); (The

⁵ After the start of the project, the project components in Basrah City and Mosul City were canceled.

field study conducted by the assistants: March-April 2023)⁶

2.3 Constraints During the Evaluation Study

Although the output of this project was the development of a subscriber network in a part of Baghdad City, the target value for the operation and effect indicator (the number of subscribers for the fixed broadband Internet service) set at the time of the project appraisal used a country-level value, and no target value was set for the portion covered by this project. Since it would be inappropriate to use the target value set in the appraisal to evaluate the effectiveness of the project, the demand forecast value included in the project's engineering design report was used.

3. Results of the Evaluation (Overall Rating: A⁷)

3.1 Relevance/Coherence (Rating: ③⁸)

3.1.1 Relevance (Rating: ③)

3.1.1.1 Consistency with the Development Plan of Iraq

At the time of the appraisal, the *National Development Plan* (2010-2014) emphasized the telecommunications sector as a sector that provides the foundation for economic activities and civic life. The Plan aimed to bring telecommunication services up to international standards through the use of public and private funding. Its stated goals included the expansion of fixed telephone networks in urban and rural areas, an improvement in the quality of telephone and Internet services, and the provision of broadband Internet services at appropriate prices. In addition, the *Medium-Term Development Strategy* (2010-2014) of the Ministry of Communications (MOC) called for the expansion and reconstruction of the switching and subscriber networks to bring the country's telecommunications capability to a level similar to those of neighboring countries, with a goal of increasing the penetration rate of fixed telephone lines to 15.95% by 2016.

At the time of the ex-post evaluation, the *National Development Plan* (2018-2022) calls for providing a competitive and attractive environment for the private sector in the Information and Communication Technology (hereinafter referred to as "ICT") sector, increasing the telephone penetration rate (whether fixed or mobile), deploying broadband services, improving the access to ICT services for all people, and ensuring cybersecurity. In addition, the MOC's development plan (the MOC's version of the above-mentioned *National Development Plan* (2018-2022)) has

⁶ In this ex-post evaluation, for security reasons, the evaluator conducted interviews with executing agency representatives in a third country (Jordan) instead of conducting the field study in Iraq, and field study assistants conducted the field study under the direction of the evaluator.

⁷ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

⁸ ④: Very High, ③: High, ②: Moderately Low, ①: Low

also set a goal of developing Fiber To The Home (hereinafter referred to as “FTTH”)⁹ lines throughout Iraq as part of its efforts to improve access to ICT services for all people.

Therefore, the consistency of the project with Iraq’s development plans is high both at the times of the appraisal and the ex-post evaluation.

3.1.1.2 Consistency with the Development Needs of Iraq

There are two types of technologies that connect users, the ultimate beneficiaries of telecommunication services, to subscriber networks: wired communication technologies (fixed telecommunication networks) and wireless communication technologies (wireless telecommunication networks). Because there was a significant need for the former at the time of the project appraisal, this project, which assisted this need, was consistent with it. At the time of the appraisal, the following issues were identified: (1) because the Communications and Media Commission (hereinafter referred to as “CMC”), which is in charge of allocating radio frequencies to each telecommunication operator, had a narrow frequency band to allocate, it was difficult to secure new allocations of frequencies necessary for this project to apply wireless communication technology; (2) frequency interference with other operators (especially the military) could not be eliminated, and (3) wireless communication technology had limited communication capacity and could not accommodate a sufficient number of subscriber lines. The project was designed to provide wired (fixed) telecommunication lines, collectively referred to as FTTx¹⁰ and was thus consistent with the goal of addressing these issues. Based on demand forecasts, the penetration rate of fixed telephone lines in Iraq in 2016 was expected to be 15.95%, and the demand for fixed broadband Internet service lines was expected to be 462,000 for the same year.

The penetration rate of fixed telephone lines in Iraq increased to 7.3% in 2017, then decreased to 6.3% in 2021, with no significant increase or decrease since the time of the appraisal.¹¹ On the other hand, the mobile phone penetration rate is significantly higher, exceeding 100% in 2017-2019 and reaching 98%-99% in 2020-2021.¹² This trend of a decline in the penetration rate of fixed telephone lines and an increase in that of mobile phones is similar worldwide. In neighboring Jordan, the penetration rate of fixed telephone lines was only 3.8% in 2020, while the mobile phone penetration rate was 68.5%.¹³ In addition, in Iraq, the FTTH networks are developed and provided primarily for data communications such as the Internet rather than for

⁹ FTTH is one of the generic terms for broadband transmission methods using optical fiber cables and refers to a method in which optical fibers are laid from an edge router (a device that converges subscriber lines) to each subscriber’s home using an optical splitter (a device that splits optical fibers). This project adopted this method.

¹⁰ Initially, this project planned to adopt, in addition to FTTH mentioned above, Fiber To The Building (FTTB, a method in which optical fiber is laid from the edge router to the building where offices and other facilities are located) and Fiber To The Cabinet (FTTC, a method of laying optical fiber from the edge router to the cabinet for distribution frames installed on the street).

¹¹ Source: Iraq’s Central Statistical Organization (CSO) (URL: <https://cosit.gov.iq/ar/2015-11-23-08-16-32>) (accessed on August 1, 2023)

¹² Source: same as above

¹³ Source: *World Information and Communication Circumstances*, the Ministry of Internal Affairs and Communications (URL: <https://www.soumu.go.jp/g-ict/index.html>) (accessed on August 1, 2023)

fixed telephone lines, and the demand for fixed broadband Internet services in the country has been increasing in recent years. At the time of the ex-post evaluation, FTTH (fixed broadband Internet) networks are rapidly being developed throughout Iraq, and according to the MOC, approximately 600,000 lines have been developed as of the end of 2022 (of which 150,000 lines were developed under the project), and the number is expected to reach 3 million lines in the next two to three years. Therefore, at the time of the ex-post evaluation, the need for the project remains high.

Table 1 FTTH network development in Iraq

(Unit: Number of lines)			
2019	2020	2021	2022
311,304	N/A	382,418	600,000

Source: CSO; data provided by the executing agency

Note: The 2022 figure is an approximation. In addition, the above data exclude the Kurdistan region.

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

3.1.1.3 Appropriateness of the Project Plan and Approach

As described below, a number of changes were made in the outputs of this project. In particular, with regard to the broadband transmission method, the MOC initially requested the adoption of the FTTH method, in which optical fiber is directly connected to each user's house, instead of the FTTB and FTTC methods because: (1) the electricity supply in Iraq was insufficient with frequent power outages and, in particular, the power supply to distribution frames for FTTC installed on the streets would be unstable; (2) in areas with high security concerns, distribution frames would be at a high risk of being stolen, and (3) many Iraqi residences are detached single-family houses rather than condominiums. However, compared to adopting only the FTTH method, the FTTB and FTTC methods are less costly because the total amount of optical fiber to be laid is less. For this reason, it was originally planned to adopt all three methods along with the installation of a solar battery system to deal with power outages. However, after the start of the project, the outputs were modified to adopt only the FTTH method due to the above-mentioned concerns. Since the construction of maintenance centers in Mosul and Basrah, which was included in the original outputs, was not directly related to the FTTH network development in Baghdad, it was possible during the initial planning stage to choose to focus on the development of the FTTH network in Baghdad, i.e., not to include the construction of these centers in the scope of the project and use the budget for these centers for adopting the FTTH method only. Therefore, there is some concern as to whether the plan at the time of the appraisal was optimal. However, the decision made during the project implementation to cancel the construction of the centers and modify the outputs to include only the FTTH method seems reasonable and appropriate for the purpose of achieving the project objective.

At the time of the appraisal, it was also assumed that the project would use the IP Multimedia Subsystem (hereinafter referred to as “IMS”),¹⁴ which was being installed at that time with Iraq’s own funds. However, the installation of the IMS was significantly delayed, and there was no prospect that it would become operational during the project implementation. Therefore, it was decided to develop the IMS by additionally including it within the scope of the ODA loan. IMS functions were implemented by upgrading the existing NGN to effectively use the existing network framework and software licenses. It appears that this action was necessary to achieve the project objective.

This project adopted the FTTH network, which enables high-speed and large-capacity data communication, and the IMS, which is required to realize multimedia services. It appears that they were adopted based on the lessons learned from past projects, taking into consideration the international trends in telecommunications technology and local applicability at the time of implementation.

Regarding the considerations for and fairness to marginalized people, the MOC informed the evaluator that there had been no discussions with the Japan International Cooperation Agency (JICA) during the project appraisal and implementation on fairness and consideration to marginalized people. However, the project did not have any components that would disadvantage these people. In addition, the project area included congested areas where poor people reside, and the FTTH network was constructed after properly forecasting the demand in these areas.

Therefore, no particular problems were found with regard to the modifications in the project’s plan and its consideration for and fairness to marginalized people.

3.1.2 Coherence (Rating: ②)

3.1.2.1 Consistency with Japan’s ODA Policy

At the time of the appraisal, the *Country Assistance Policy for the Republic of Iraq* (2012) identified the strengthening of basic economic infrastructure as one of the priority areas for assistance, specifying the telecommunications sector as one of the priority sectors in promoting domestic and foreign private investment and job creation.

3.1.2.2 Internal Coherence

At the time of the appraisal, there were no specific plans for collaboration or coordination with other JICA projects.

¹⁴ The IMS is the core system enabling an NGN, and it is intended to effect multimedia services by integrating public communication services, such as fixed telephone networks and mobile communication networks, that previously had different access networks, with protocols used in IP communications.

3.1.2.3 External Coherence

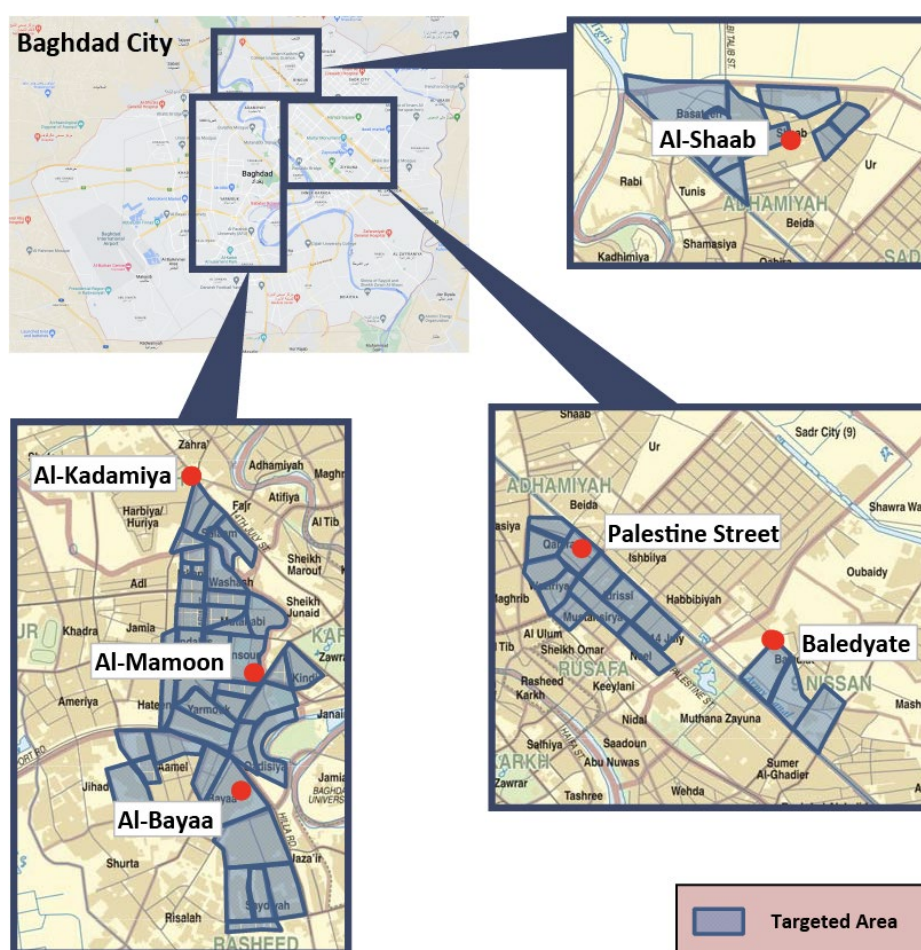
At the time of the appraisal, there were no specific plans for collaboration or coordination with projects implemented by other Japanese organizations or with assistance by other development cooperation organizations, including other donors, or the private sector.

With respect to internal and external coherence, although it was not anticipated at the time of appraisal to have specific collaboration with other projects, the project is consistent with Iraq's development policy and development needs at the time of the appraisal and ex-post evaluation and with Japan's ODA policy at the time of the appraisal. Therefore, its relevance and coherence are high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

The target areas for the outputs developed under the project are indicated below.



Source: Prepared by the evaluator based on the map included in the documentation provided by JICA.

Figure 1 Project area

The planned and actual outputs from the project implementation are shown in Table 2.

Table 2 Contents of civil engineering works and procured equipment

Main Item	Plan	Actual
Construction of an IP communication system and a 150,000-line subscriber network in Baghdad City	Edge router: 22 sets	12 sets
	Subscriber line terminal equipment/ADSL ONU: 968 sets, VDSL ONU: 256 sets	Canceled
	SIP access gateway for FTTB: 24 sets, SIP access gateway for FTTC: 124 sets	Canceled
	Solar battery system: 124	Canceled
	Shelter for distribution frames: 124 sets	Canceled
	VDSL modem: 23,500 units, ADSL modem: 122,000 units	Canceled
	Optical network subscriber line terminal equipment/OLT: 23 sets, ONT: 4,500 units	OLT: 31 sets, ONT: 15,000 units
	Cabling material	Same as left

Main Item	Plan	Actual
	Training for IP communication system and subscriber network	Same as left
	-	(Additional) L2-SW: 12 sets
		(Additional) FMS: complete set
		DC power supply: 6 sets, PDB: 12 sets, accessories: complete set, training instruments: complete set, spare parts: complete set ¹⁵
		(Additional) IMS: complete set
		(Additional) Billing system: complete set
		(Additional) Training for IMS and billing system
		(Additional) Public Wi-Fi access solution: complete set
Construction of outside plant maintenance centers in Basrah and Mosul Cities	Outside plant maintenance center buildings in Basrah and Mosul Cities, maintenance tool and equipment	Canceled

Source: Documentation provided by JICA; interviews conducted with the executing agency and the main consultant

As stated above, the plan was changed from the adoption of all three methods (FTTB, FTTC, and FTTH) to the adoption of only the FTTH method. As a result, the procurement of equipment for the adoption of the FTTB and FTTC methods was canceled, and Layer 2 switches (L2-SW) were procured in place of gateway equipment. In addition, as a result of this modification, the number of ONTs to be procured was increased, and the number of OLTs to be procured was adjusted (increased) according to the actual locations of subscribers. Although it was originally planned to procure 22 sets of edge routers, fewer sets were procured, due to constraints in the project cost during the project implementation, by making this up by using the existing ten sets. Moreover, in light of the situation in Iraq, it was decided to additionally procure the Fiber Monitoring System (hereinafter referred to as “FMS”), which is an important facility to identify disconnected or defective sections within an optical fiber network. Furthermore, in connection with the aforementioned additional development of an IMS, a billing system was set up to add capabilities for online customer management and billing and payment processing. However, the construction of the outside plant maintenance center in Mosul City was canceled due to the occupation of the city by the “Islamic State of Iraq and the Levant (ISIL)” since June 2014, which made the construction impossible. Meanwhile, the construction in Basrah City was canceled due to a budget shortage caused by: (1) the significant impact of exchange rate fluctuations; (2) the

¹⁵ While these pieces of equipment are not mentioned in the appraisal documents, according to the main consultant, they should normally be included in the implementation of the telecommunications projects and are believed to have been planned at the time of the appraisal.

change in the transmission method to only FTTH (by canceling the FTTB and FTTC methods); (3) the addition of an IMS and billing system, and (4) the submitted bids in the bidding and contracts for civil works and equipment procurement that were significantly higher than the estimated contract amount. Although the maintenance centers have not been constructed as of the ex-post evaluation, this does not seem to have an impact on the achievement of the project's objective because they are not directly related to the FTTH network developed under the project.

In the original plan, the consulting services included detailed design, equipment procurement support, construction supervision support, support for preparing operation and maintenance (O&M) manuals, and support for conducting training related to IP network technology and other technologies. However, another item was added to the list: an assessment on the introduction of a public and private partnership (hereinafter referred to as "PPP") for the O&M of the FTTH network developed under this project (an assessment on the establishment of a PPP scheme and the preparation of draft bidding documents and contracts). The actual amount of consulting service work was 596 person-months in total (220 person-months for foreigners and 376 person-months for locals), compared to the planned 424 person-months in total (175 person-months for foreigners and 249 person-months for locals). Due to the addition of the consulting service component mentioned above and the extension of the contract period, the overall volume of work increased.

In each case where the output was modified, the increase or decrease was based on reasonable grounds, and these modifications were made based on reviews and agreements between the executing agency and JICA; therefore, no particular problems were found in these modifications.



Photo 2: FMS procured under the project
(Source: Ex-post evaluation team)

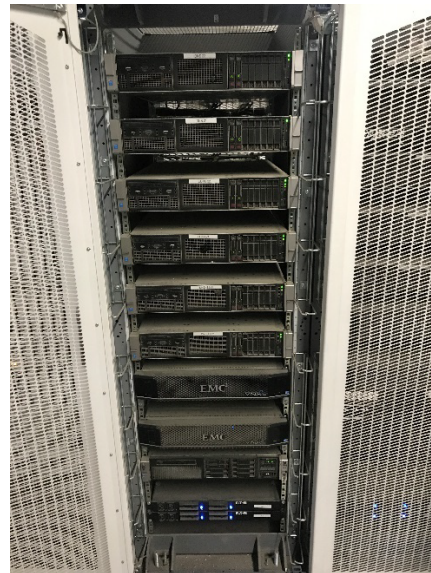


Photo 3: Part of IMS procured under the project
(Source: Ex-post evaluation team)

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 project cost at the time of the appraisal was 12,821 million yen (10,858 million yen for the amount paid in foreign currency and 1,963 million yen for the amount paid in local currency), of which the ODA Loan was 11,674 million yen. The actual amount of the project cost was 12,170 million yen (11,642 million yen for the amount paid in foreign currency and 528 million yen for the amount paid in local currency), of which the ODA loan was 11,642 million yen. The actual amount was within the plan (95% against the plan). However, while the actual amount is based on the data provided by JICA, the MOC believes that it is highly likely that the local currency portion of the actual amount (equivalent to administrative cost (not covered by ODA loan but borne by the Iraqi government)) in the JICA-provided data was not updated from the planned amount at the time of the appraisal. Therefore, it is likely that the local currency portion of the actual amount was around 252 million yen.¹⁶ In addition, since a number of changes were made in the outputs of this project, the actual amount was 83% of the planned amount when major changes in the outputs were taken into account.¹⁷ The reason why the actual amount was lower than the planned amount can be attributed to the significant impact of exchange rate fluctuations throughout the project period.

3.2.2.2 Project Period

The project period planned at the time of the project appraisal was 44 months in total from October 2012 (signing of the loan agreement) to May 2016 (commencement of the service of the facilities installed under the project); however, the actual project period was 111 months in total from October 2012 (signing of the loan agreement) to December 2021 (commencement of the service of the facilities installed by the project), which significantly exceeded the plan (252% against the plan). Since the time required to procure the additional outputs, the IMS and the billing system, overlapped with the time required to procure other components, it is difficult to evaluate the actual period that takes into account the changes in the outputs. The reasons why the actual period significantly exceeded the plan are as follows.

The consulting service period was extended because the design of additional outputs (IMS and billing system) required additional time, the assessment on the introduction of a PPP in the O&M for the FTTH network was added to the consulting service because the executing agency was unfamiliar with the implementation of a PPP and it was determined that expert knowledge would be necessary, and the construction period was extended. The construction period was extended

¹⁶ According to the MOC, during the project implementation period, the project is estimated to have spent (up to) approximately 9 million yen for site preparation of the planned construction sites, (up to) approximately 18 million yen for expenses for participating in meetings (including travel expenses), and (up to) approximately 225 million yen for personnel expenses for MOC staff engaged in project supervision, for a total of (up to) approximately 252 million yen.

¹⁷ We calculated the planned amount after reflecting the changes in major outputs (14,304 million yen) by deducting the planned construction cost of the canceled maintenance centers (489 million yen) from the planned project cost (12,821 million yen) and adding the procurement cost for the additional output components, IMS and billing system (1,972 million yen (actual amount as there is no planned amount)). Comparing the actual amount (11,894 million yen) calculated using the realistic local currency portion (252 million yen) with the planned amount after reflecting the changes in major outputs, it is 83% against the plan (source of each cost: data provided by JICA).

because it took six months for the equipment to clear the customs in Zakho, additional outputs (IMS and billing system) were procured, whenever the conditions along the planned installation route prevented the installation of optical fiber, the installation area was changed accordingly and redesign and construction works in the changed area were carried out (in Iraq, there is no systematic record of public service infrastructure such as electric cables, water pipes, and communication lines, and they are all buried in a disorderly manner, which made it difficult to install the optical fiber network), and there were some cases where it took extra time to obtain construction permits due to deteriorating security conditions. Furthermore, after the construction was completed, the PPP operator, a private contractor, was not selected in a timely manner, and the selection process took approximately three years.

Table 3 Comparison of the project period

Description	Plan	Actual
Selection of consultant	October 2012 – September 2013 (12 months)	May 2012 – May 2013 (13 months)
Consulting services	November 2013 – May 2016 (31 months)	December 2013 – September 2018 (58 months)
Bidding/contracting	January 2014 – February 2015 (14 months)	September 2014 – July 2015 (11 months)
Construction work	March 2015 – May 2016 (15 months)	September 2015 – May 2017 (21 months)
Selection of operator	–	October 2018 – July 2021 (34 months)*

Source: Documentation provided by JICA; interviews conducted with the executing agency

Note: * The consulting service included an assessment on the establishment of a PPP scheme and the preparation of draft bidding documents and contracts (for the PPP). After the service was completed, an operator was selected by the executing agency (the start date of operator selection in the table above is not the exact start date). After the operator was selected in July 2021, the facility was officially put into service on December 25, 2021.

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

The Financial Internal Rate of Return (FIRR) was calculated to be 14.9% at the time of the appraisal. The conditions used for the calculation were as follows: the costs include project costs and operation and maintenance costs; the benefits include telephone and Internet usage fees; and the project life is 18 years. The FIRR was recalculated at the time of the ex-post evaluation using essentially the same conditions,¹⁸ and the result was an FIRR of 7.1%.

The Economic Internal Rate of Return (EIRR) was calculated to be 20.5% at the time of the appraisal. The conditions for the calculation were the same as for the FIRR, which was calculated using a standard conversion factor (SCF) for costs and benefits. The EIRR was recalculated at the time of the ex-post evaluation using essentially the same conditions, resulting in an EIRR of 10.3%.

At the time of the appraisal, the benefits included telephone subscription and usage fees for a total of 150,000 lines beginning in the year following the project completion and Internet usage

¹⁸ However, since the breakdown of project costs by category and by year was not available, the calculation was made using the annual expenditures (actual) included in the documents provided by JICA.

fees for a total of 150,000 lines from two years after the project completion. However, these benefits appear to have been overestimated. In fact, at the time of the ex-post evaluation, the penetration rate of fixed telephone lines in Baghdad Governorate was only 8.7%, and the number of fixed broadband Internet subscribers has been increasing at about 18%/year since the project completion, as explained below. Combined with the fact that the project was completed much later than planned, the benefits became much smaller than the ones assumed at the time of the appraisal, and as a result, both the FIRR and EIRR were much lower than the figures at the time of the appraisal.

Although 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 Impacts¹⁹ (Rating: ③)

3.3.1 Effectiveness

This project aimed to “improve the telecommunications environment, which constitutes essential industrial infrastructure” as a direct outcome. We verified this through the following quantitative effect indicators and qualitative confirmations.

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

In this project, at the time of the appraisal, “the penetration rate of fixed telephone lines” and “the number of fixed broadband Internet service subscribers” were set as indicators for quantitative effects.²⁰

Regarding the target year, it was set at the time of the appraisal as 2018 (two years after the project completion). However, as mentioned above, the project was completed in December 2021, making the actual target year (and month) November 2023.²¹

With regard to the penetration rate of fixed telephone lines, the baseline and target penetration rates for Baghdad Governorate were specified at the time of the appraisal. According to the documents provided by JICA and the data published by Iraq’s Central Statistical Organization (hereinafter referred to as “CSO”), the actual value was 8.9% in 2011 and 2014, but it decreased to 8.7% in 2021, with no significant increase or decrease since the time of the appraisal. This trend is expected to continue even two years after the project completion. However, as stated above, the decline in the penetration rate of fixed telephone lines in recent years is a global trend, and the FTTH network developed in this project is mostly used for data communications such as

¹⁹ When providing the sub-rating, Effectiveness and Impacts are to be considered together.

²⁰ Although no operational indicators were set at the time of the appraisal, for this ex-post evaluation, the evaluator attempted to obtain data on operational indicators including “call completion rate” and “telephone traffic” as complementary indicators. However, the MOC reported that, given that the penetration rate of fixed telephone lines (for the entire country) at the time of the ex-post evaluation was only about 6%, there were not enough data to calculate the actual values of these indicators.

²¹ Since the project has not reached the target year yet at the time of the preparation of this ex-post evaluation report (August 2023), actual data for the target year were unavailable.

the Internet. Therefore, it would be inappropriate to evaluate the project negatively solely on the ground that the target achievement rate for the actual value of this indicator is low.

With regard to the number of fixed broadband Internet service subscribers, the actual number of subscribers in the table below includes only FTTH line subscribers and thus is not exactly comparable to the target values at the time of the appraisal. In addition, the target value covers the number of subscribers in the entire country, and no target value was set for the number of subscribers in the portion subject to the project. The actual number of subscribers in the country in 2022 (one year after the project completion) was only about 60% of the target value. However, since the project is designed for a portion of Baghdad City, comparison with the national value is inappropriate. Meanwhile, according to the MOC, 36,677 lines (24%) (as of the end of March 2023) out of a total of 150,000 lines developed under the project have already been subscribed. According to the engineering design report by the main consultant, the demand forecast is that the number of Internet subscriptions will increase at a rate of 10% per year out of a total of 150,000 lines after the project completion and that all Internet lines will be in use ten years after the commencement of the provision of the Internet service. The fact that the percentage of the subscribed lines indeed reached 24% during the 16-month period from the project completion to the end of March 2023 indicates that the number of subscriptions (18%/year) is almost double the forecasted demand.

In addition, at the time of the appraisal, there were waiting applicants for approximately 282,000 lines for the entire country (approximately 26,000 lines in Baghdad Governorate) because there was not enough capacity to meet demand due to delays in developing telecommunications infrastructure.²² According to the MOC, there were no waiting applicants in both fixed telephone and Internet services at the time of the ex-post evaluation, and network services are provided without delay after customers apply for a network subscription.

Although the demand for wireless communication lines, such as mobile phones and mobile Internet, was higher than that for fixed (wired) communication lines at the time of the ex-post evaluation,²³ this project did not contribute to the penetration of wireless communication lines in Iraq because mobile phone service providers do not use the FTTH network developed under this project.

²² Source: documents provided by JICA. The number of waiting applicants refers to those who have applied for a telephone service but are still waiting for the telephone line to be connected.

²³ According to published data from the CSO, the number of mobile phone service subscribers in the country in 2021 was about 40 million, and the number of mobile Internet service subscribers was about 20 million. According to the MOC, of these subscribers, the number of mobile broadband service subscribers was about one million without including the Kurdistan region at the time of the ex-post evaluation.

Table 4 Effect indicators set at the time of the appraisal

Indicator	Baseline value	Target value	Actual value		
	2011	2018	2019	2021	2022
		2 Years after completion	Before completion	Project completion	1 Year after completion
Penetration rate of fixed telephone lines (Baghdad Governorate) (%)	8.9 (2009)	15.92	8.8 (55.3%)	8.7 (54.6%)	N/A
Number of fixed broadband Internet service subscribers (nationwide)	300	407,000	79,126 (19.4%)	129,483 (31.8%)	250,000 (61.4%)
(Complementary indicator) Of the above, Baghdad Governorate	N/A	N/A	60,683	96,437	N/A

Source: Documentation provided by JICA; CSO; documentation provided by the executing agency

Note: (1) Penetration rate of fixed telephone lines: Number of fixed telephone lines per 100 population

(2) According to the MOC, the number of fixed broadband Internet service subscribers at the time of the appraisal (baseline value) is likely to be the number of ADSL2 line subscribers, while the actual numbers are only for FTTH lines (the number of ADSL2 lines, WiMAX for fixed, and other broadband lines is unknown) and do not include the Kurdistan region. The actual number of subscribers in 2022 is an approximation.

(3) Actual values in parentheses in the table above indicate the percentage of target achievement.

3.3.1.2 Qualitative Effects (Other Effects)

Regarding the utilization of the equipment installed under the project, the equipment installed under the project was manufactured by Ericsson, but the company came under investigation by the U.S. Department of Justice for illegal involvement with ISIL in Iraq. For this reason, the company decided to withdraw from Iraq around 2019. As a result, the MOC became unable to receive necessary support services, such as the upgrades of the company's products. In 2019, which was before the commencement of the services on the facility, a test operation of the equipment installed under the project was conducted for a total of eight months. However, since the completion of this test, the company's IMS and billing systems and edge routers installed under the project have become inoperative. At the time of the ex-post evaluation, the Informatics and Telecommunications Public Company (hereinafter referred to as "ITPC")²⁴ under the MOC, which is in charge of the O&M of the equipment installed under this project, was managing the situation by implementing a system similar to the IMS and intends to develop a new IMS in the future. In addition, the billing system has been provided and operated by the PPP operator. However, according to the MOC, the most important and difficult part of the project component is the development of the subscriber network (optical fiber network). The IMS, which is no longer used at the time of the ex-post evaluation, is only a part of the project component, and the ITPC manages the situation by implementing a system similar to the IMS; thus, there are no major obstacles to achieving the project objective.

²⁴ At the time of the appraisal, the name of the ITPC was "Iraqi Telecommunication and Post Company (ITPC)." However, by the time of the ex-post evaluation, the postal business has been separated from the ITPC. The company provides only telecommunication services, and has been renamed to the "Informatics and Telecommunications Public Company (ITPC)."

The project's appraisal documents suggested the following qualitative effects: job creation during construction, revitalization of the private sector by improving the telecommunications environment, and strengthening of the executing agency's O&M system by providing training and preparing manuals; however, since these are impact-level effects, they will be discussed in the "3.3.2 Impact" section. The FTTH network developed in this project targets mostly regular households (individual users), and according to interviews with several individual users of the network, the network is fast and stable and is easier to use than mobile Internet. According to the ITPC and the PPP operator, the quality of the network has been passed on by word of mouth among subscribers, and the high reputation of the service has led to requests for service subscriptions from people outside the coverage area.

In light of the above, this project provided Baghdad City with a fixed broadband Internet network that offers highly stable, high-speed and high-capacity data transmission, and the number of subscribers to the service has been growing faster than the forecasted demand; there has been no backlog in the provision of the service, and the service has been well received by its users. Therefore, the project contributes to the improvement of the telecommunications environment in the city.

3.3.2 Impacts

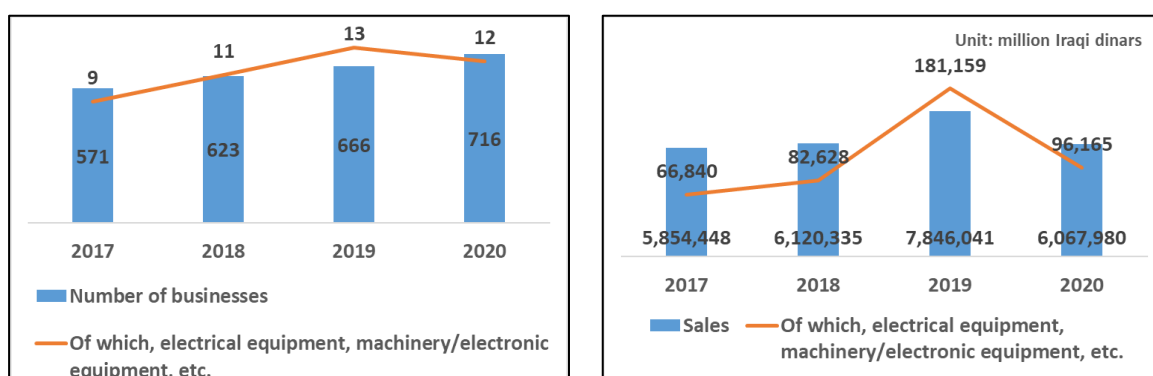
3.3.2.1 Intended Impacts

The impact of the project as intended at the time of the appraisal was "contributions to the economic and social reconstruction of Iraq" (specifically, job creation during construction, revitalization of the private sector through the improvement of the telecommunications environment, increased job opportunities in the sector through the development of the information industry, and strengthening the O&M system of the executing agency through training and the preparation of manuals).

First, regarding job creation and increased job opportunities, according to the MOC, the number of new employees in the Iraqi telecommunications sector has increased since the start of the project, as the implementation of the project triggered the construction of FTTH networks throughout the country, as described below. According to the Ministry's statistical data, the number of new jobs in the telecommunications sector generated by the project at the start of the project (2012) was approximately 90, but by the time of the ex-post evaluation (2022), the number had increased to approximately 320, indicating that the project contributed to job creation in the sector.

Secondly, with regard to the revitalization of the private sector through the improved telecommunications environment, although there are no data that directly indicate a causal relationship between them, partly because it has been less than two years since the project was completed, the project has contributed to the revitalization of the private sector to a certain extent. According to the MOC, the supply of telecommunications equipment has also increased along with the development of the FTTH network throughout the country (production and sales in the

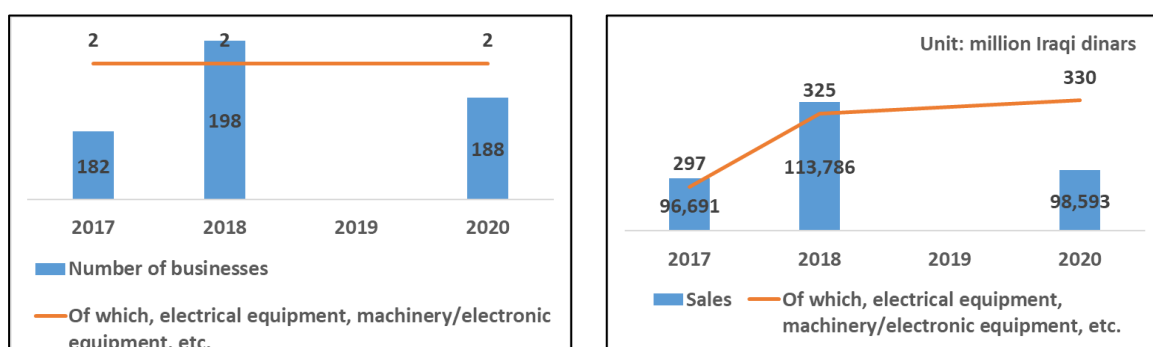
telecommunications equipment manufacturing industry have also increased). According to statistical data published by the CSO, the number of businesses, sales, and GDP in the manufacturing sector as a whole have been generally increasing in recent years, as shown in the figures below, with a particularly marked increase in the number of small businesses in the manufacturing of electrical equipment, machinery, and electronic equipment, the sectors related to the telecommunications sector. Therefore, this project is likely to have contributed to a certain extent to the “economic and social reconstruction of Iraq” through the creation of jobs in the Iraqi telecommunications sector and the promotion of the country’s manufacturing industry related to telecommunications equipment.²⁵



Source: CSO

Note: The above data do not include the Kurdistan region. Large businesses: 30 or more employees

Figure 2 Number of businesses and sales in the manufacturing sector in Iraq (large businesses)

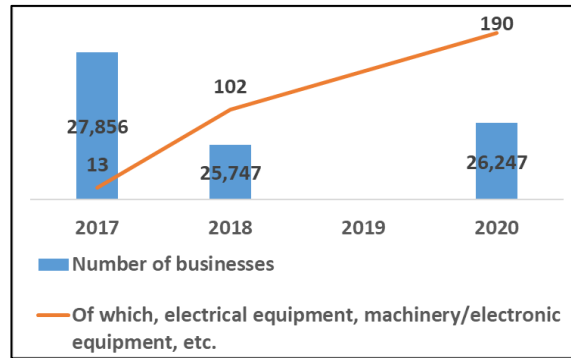


Source: CSO

Note: The above data do not include the Kurdistan region. Medium-size businesses: 10 to 29 employees; data for 2019 have not been published.

Figure 3 Number of businesses and sales in the manufacturing sector in Iraq (medium-size businesses)

²⁵ At the time of preparing this ex-post evaluation report (August 2023), the published data of the CSO shown in the figures below are only available until 2020. Although the period shown in the figures below is before the start of service of the project, according to the MOC, FTTH networks are being developed throughout the country, triggered by the implementation (not necessarily completion) of the project. As a result, the supplies of telecommunications equipment have increased. Therefore, the project is likely to have contributed to promoting the country’s manufacturing industry related to telecommunications equipment.

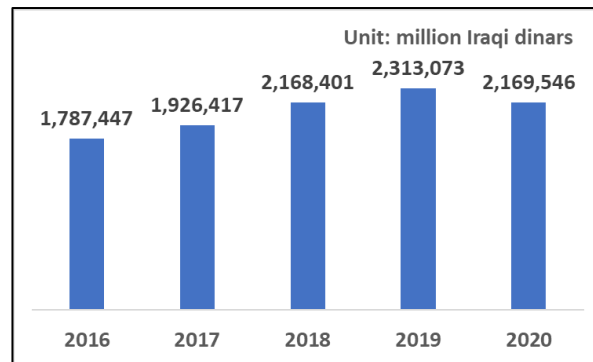


Source: CSO

Note: The above data do not include the Kurdistan region.

Small businesses: less than ten employees; 2019 data and sales data have not been published.

Figure 4 Number of businesses in the manufacturing sector in Iraq (small businesses)



Source: CSO

Note: GDP figures are in constant prices, with 2007 as the base year.

Figure 5 GDP in Iraq's manufacturing sector

In addition, as stated above, although most of the users of the FTTH network developed under the project are individual users, the project area also has public institutions, universities and schools, medical institutions, etc. According to the MOC, the project has also contributed to improving the educational environment by providing a highly stable, high-speed, high-capacity Internet. Furthermore, according to the Ministry, the ITPC learned the O&M methods for FTTH network equipment through the training conducted during the project implementation and the ITPC and the PPP operator currently use the O&M manuals prepared under the project. Therefore, the O&M system has been strengthened through the training and the preparation of the manuals.

3.3.2.2 Other Positive and Negative Impacts

1) Impacts on the Environment

At the time of the appraisal, this project was classified as Category C under the *Japan Bank for International Cooperation Guidelines for Confirmation of Environmental and Social Considerations* (formulated in April 2002), as it was judged to have minimal undesirable effects on the environment. According to the MOC, since this project did not involve the installation of

radio towers or the impact of electromagnetic waves on the human body, it was determined by the Ministry of Environment that the project would not be subject to environmental impact monitoring. According to the MOC and the main consultant, the project area, as had been expected at the time of the appraisal, did not fall into a sensitive area and had minimal environmental impact during the project implementation. No significant environmental or other impacts occurred during the construction of the project. In addition, in the excavation of optical fiber cables, a special excavation machine was prepared, and a method called the mini-trench method was adopted to increase the excavation volume (length) from the usual 200 m/day to 500 m/day, thereby minimizing the period of disturbance to public transportation.

2) Resettlement and Land Acquisition

At the time of the appraisal, it was assumed that no land acquisition or involuntary resettlement would occur under the project because the fiber optic network would be laid on the existing road site. According to the MOC, no resettlement or land acquisition occurred under the project.

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

As stated above, consideration for and fairness to marginalized people were not specifically discussed at the time of the appraisal. However, according to the MOC, the project components did not disadvantage marginalized people, such as people experiencing poverty.

4) Unintended Positive / Negative Impacts

According to the MOC, projects to develop FTTH networks have been carried out throughout Iraq based on the knowledge and experience gained from this project (specifically, how to implement a series of processes, from the initiation to completion, for consultant and contractor contracts, how to implement and manage the PPP scheme, and other project management methods as stipulated in JICA guidelines (*Guidelines for the Employment of Consultants under Japanese ODA Loans and Guidelines for Procurement under Japanese ODA Loans*)). The importance of this project is very high because it triggered the expansion of the FTTH network in Iraq.

In light of the above, although the actual penetration rate of fixed telephone lines is lower than the target, this is in line with a global trend, and apart from this, the project has mostly achieved its objectives. Therefore, 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,” as of the ex-post evaluation, the national development plans still call for improving the telecommunications environment and developing FTTH networks

throughout Iraq; thus, policies and systems are in place to ensure the sustainability of the project's outcomes.

3.4.2 Institutional/Organizational Aspect

At the time of the appraisal, it was planned that the Network Section of the ITPC (which had a total of 20,467 employees at the time of the appraisal; of which 17,667 were engaged in telecommunication services) under the MOC would be responsible for the O&M of the facilities and equipment installed under the project with the support of the Data Network and Transmission Section and the Switching Section. The total number of personnel in these three departments who engaged in O&M was 3,186 for Iraq as a whole and 994 for Baghdad City alone. In addition, at the time of the appraisal, the provision of broadband Internet services was handled by the State Company for Internet Services (hereinafter referred to as "SCIS"), a state-owned company under the MOC (the number of employees at the time of the appraisal: 523).

At the time of the ex-post evaluation, the ITPC was in the process of organizational restructuring, including the reduction in the number of and consolidation of departments to improve operational efficiency. SCIS was consolidated with the ITPC in 2018. The ITPC has a total of about 10,000 employees, of which 1,265 are assigned to the Network Section, the Data Network and Transmission Section, and the Switching Section, which are in charge of the O&M of various equipment. As stated above, a PPP has been introduced in the O&M of the subscriber network developed under this project, and a ten-year contract commencing in July 2021 has been awarded to Hala AlRafidain Company for Communications and Internet Ltd. (hereinafter referred to as "Hala AlRafidain Company"). Regarding the division of roles between the ITPC and Hala AlRafidain Company, the ITPC is in charge of monitoring (24 hours a day) various equipment at each of the ITPC's FTTH base stations (six in total in Baghdad City) and supervising Hala AlRafidain Company. Hala AlRafidain Company, on the other hand, is in charge of installing optical fiber from base stations to individual households, installation of ONTs, collection of the usage fees for the optical fiber, O&M of optical fiber networks and various equipment, and marketing and customer service for broadband Internet services. At the time of the ex-post evaluation, the company had a total of 582 employees (278 employees and 304 outsourced personnel). The ITPC and Hala AlRafidain Company indicated that their staffing was sufficient to perform appropriate O&M of telecommunications facilities and equipment, including the facilities installed under this project.

Considering that an O&M system has been established through the PPP, that O&M is not experiencing issues except for the equipment that became inoperable due to Ericsson's withdrawal and the failures of the FMS discussed below, and that the ITPC and Hala AlRafidain Company reported that the network is restored within six to 12 hours after a network failure, there do not seem to be any problems with staffing.

3.4.3 Technical Aspect

At the time of the appraisal, it was decided to include training on IP network technology in the project, as it is essential to develop human resources to facilitate a smooth introduction of the equipment to be procured under the project and to improve the technical capabilities of the ITPC and the SCIS. According to the MOC and the ITPC, the ITPC staff learned new O&M techniques through the training provided by the project's contractors and consultants. As a result, the technical capabilities of its staff in the O&M of FTTH networks and procured equipment have improved. According to the ITPC and Hala AlRafidain Company, to properly perform the O&M of the facilities and equipment installed in this project, a wide range of technical capabilities are required, including optical power testing, optical time domain reflectometer testing, optical fiber cable splicing, terminating optical connectors, disconnection detection, connecting and disconnecting to subscribers' homes, troubleshooting, customer support, etc. The ITPC and Hala AlRafidain Company reported that they both have sufficient technical capabilities in these areas. In addition, given that the technical qualifications of Hala AlRafidain Company's staff were one of the selection criteria in the competitive bidding process, that staff training is provided within the company, that the ITPC conducts workshops twice a year (on issues, solutions, best practices, etc., in the ICT field) for Hala AlRafidain Company and other stakeholders in collaboration with vendors, and that the ITPC and Hala AlRafidain Company also utilize the manuals prepared under this project, there do not seem to be any issues with the technical aspect overall.

3.4.4 Financial Aspect

At the time of the appraisal, the ITPC's main revenues came from subscriptions and network connection fees from users, and the O&M expenses were expected to be covered by the company's revenues. At the time of the ex-post evaluation, the ITPC was still a self-sustaining public corporation and was not receiving annual budget allocations from Iraqi government agencies, such as the MOC. However, as a state-owned company, it pays 10% of its profits to the government each year and is permitted to request budget allocations to the government if it needs budgets for large-scale infrastructure development or repairs. Pursuant to the terms of the contract, Hala AlRafidain Company is responsible for all O&M expenses related to the facilities and equipment installed under the project. Although the ITPC's financial statements as of the time of the ex-post evaluation were not available, since the subscriber network developed in this project is mainly used for data communications, such as the Internet, as stated above, the status of revenues and expenditures related to O&M at the time of the ex-post evaluation can be roughly estimated as follows.

First, regarding revenues, according to the ITPC, although the price varies by package, the monthly fee for data communications such as the Internet averages 27 USD/month. Since there are a total of 36,677 subscribers as of the end of March 2023, the total revenue from the portion covered by this project is 990,279 USD/month. On an annual basis, this would amount to

approximately 12 million USD in sales. The company explained that the fee collection rate is 100% due to the prepaid system.

Secondly, regarding expenditures, pursuant to the terms of the contract, Hala AlRafidain Company is required to pay the ITPC a concession fee out of the revenues mentioned above based on the number of years from the commencement of the contract to its termination.²⁶ As of the end of March 2023, the concession fee paid to the ITPC is 30% of the collected fee; in other words, 70% of the collected fee is paid by the ITPC to Hala AlRafidain Company as O&M expenses, from which the actual amount required for O&M is disbursed. According to Hala AlRafidain Company, the amount required for O&M at the time of the ex-post evaluation is approximately 1,172 million IQD/year (approximately 800,000 USD/year), which is fully covered by sales. For reference, the table below compares expected revenues and expenditures at the time of the ex-post evaluation and when the number of subscribers reaches 150,000. Considering that the O&M expenses for the facilities and equipment installed under the project are expected to be covered by revenues in the future and that the ITPC can request budget allocation to the government as needed, there do not seem to be any major financial problems.

Table 5 ITPC's estimated revenues and expenditures for O&M (portion covered by the project)

(Unit: USD/year)

Item	March 2023	Upon reaching 150,000 lines
Broadband Internet service revenues	Approximately 11,900,000	Approximately 48,600,000
O&M expenses (payment from ITPC to Hala AlRafidain Company)	Approximately 8,300,000	Approximately 9,700,000

Source: Documentation provided by the executing agency

Note: The amounts in the table above were calculated as follows: revenues as of March 2023: 27 USD/month x 36,677 persons x 12 months = 11,883,348 USD/year. Therefore, the amount is approximately 11,900,000 USD. Expenditures at the same point in time: calculated as 70% of the amount of revenues. Revenues upon reaching 150,000 lines: 27 USD/month x 150,000 persons x 12 months = 48,600,000 USD/year. Expenditures at the same point in time: calculated as 20% of revenues.

3.4.5 Environmental and Social Aspect

As stated above, no negative impacts on the natural and social environment were observed; thus, there is no evidence of sustainability risk from an environmental and social perspective.

3.4.6 Preventative Measures to Risks

Some Internet Service Providers (ISPs)²⁷ are connecting their own towers to the FTTH core network without permission to illegally provide wireless communication services to their customers, which can adversely affect the FTTH's network speed and lead to a decrease in profits for the ITPC. The company is taking technical solutions to mitigate this problem. In addition, as

²⁶ Pursuant to the terms of the contract, Hala AlRafidain Company is required to pay the ITPC a concession fee of 30% of the sales (collected fees) for the first two years of the contract, 40% for the third year, 60% for the fourth year, 70% for the fifth and sixth years, 75% for the seventh and eighth years, and 80% for the ninth and tenth years.

²⁷ ISPs that provide Internet services to end users, called Tier-3 ISPs.

stated above, there is no systematic record of public service infrastructure such as electric cables, water pipes, and communication lines in Iraq, and they are all buried in a disorderly manner. The optical fiber network is frequently cut during underground excavation works, such as water pipe construction, requiring repair work. Hala AlRafidain Company has been taking prompt measures to repair the network. Therefore, although there are risks that may affect the sustainability of the project's effects, appropriate measures are being taken.

3.4.7 Status of Operation and Maintenance

As stated above, the ITPC monitors various equipment (24 hours a day) at each FTTH base station (six in total in Baghdad City). Hala AlRafidain Company conducts daily inspections of telecommunications equipment, power supply equipment, etc., and periodic visual inspections of the optical fiber network according to a maintenance plan. At the time of the ex-post evaluation, the following problems existed.

First, with regard to the FMS procured under the project, frequent power outages and power system problems in the base station caused the FMS to shut down several times, resulting in a malfunction of the FMS system, and most of the system has not functioned since 2022. The ITPC and Hala AlRafidain Company have requested repairs to the manufacturer but have not reached an agreement with the manufacturer regarding the cost of repairs, and negotiations on the cost are still ongoing. Hala AlRafidain Company is attempting to identify the locations of disconnections and defects in the fiber optic network using alternative technologies and solutions.

In addition, there was a fire at one of the ITPC base stations, the Baledyate site, recently,²⁸ and this fire rendered the OLT (one set), L2-SW (two sets), etc., unusable. The unusable equipment is substituted with unused equipment procured under this project. The ITPC explained that the contract with Hala AlRafidain Company explicitly states that the company is responsible for procuring new equipment in such cases, and the company will therefore procure the equipment.

All pieces of equipment procured under this project, except for the ones described above and the previously described equipment manufactured by Ericsson, have been operated and maintained without any problems. Although it is somewhat unclear whether the increase in the number of subscribers to 150,000 will cause problems if the FMS and the equipment disabled by the fire remain inoperable, O&M is conducted in a generally appropriate manner through the PPP scheme.

Slight issues have been observed in the current status of operation and maintenance, however, there are good prospects for improvement/resolution. Therefore, sustainability of the project effects is high.

²⁸ According to Hala AlRafidain Company, the fire was caused by a fire that broke out in the air conditioning system, but the cause of the fire has already been addressed.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project aimed to improve the telecommunications environment, which constitutes essential industrial infrastructure, by developing a subscriber network in Iraq's major city (Baghdad). The relevance and coherence of the project are high, as the project plan is consistent with Iraq's development plans and needs and Japan's ODA policy, and the project plan, approach, etc., also appear appropriate. The efficiency of the project is moderately low because, while the project cost was within the plan, the project period significantly exceeded the plan. Considering that the number of fixed broadband Internet service subscribers in the project area has been growing faster than the forecasted demand, that there has been no significant backlog in the provision of the service, and that the service has been well received by its users, the project has contributed improving the telecommunication environment in the city. The project has also contributed to the country's economic and social reconstruction as it has helped to create jobs in the Iraqi telecommunications sector and is promoting the country's telecommunications equipment manufacturing industry. Therefore, the effectiveness and impacts of the project are high. The sustainability of the project effects is high because, while there are some minor problems with respect to the status of operation and maintenance, no issues have been observed overall in the policy/system, institutional/organizational, technical, and financial aspects and countermeasures to risks, etc.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency (ITPC)

As stated above, most parts of the FMS installed under the project are in a non-functional state, and some pieces of the equipment have been rendered unusable due to fire. The number of subscribers to the FTTH networks developed through this project is increasing steadily. If the number of subscribers continues to increase at the same rate as it is at the time of the ex-post evaluation (18% per year), it is expected to exceed 100,000 in 2025 and 150,000 in 2027. It is desirable that problems with the equipment be addressed and resolved as soon as possible so as not to cause problems after the increase in the number of subscribers.

4.2.2 Recommendations to JICA

It is desirable to follow up on the above matter by providing necessary support to the executing agency to ensure that the equipment installed under the project is utilized.

4.3 Lessons Learned

(1) Need for swift project implementation

Although the project initially aimed to promote the use of fixed telephone lines, at the time of the ex-post evaluation, the FTTH network developed under the project was not used much as a fixed telephone line. As stated above, the decline in the demand for fixed telephones is a global trend. However, given that the ICT sector is one in which technological innovation and demand change rapidly, it is essential to proceed swiftly from project formation to the commencement of the operation.

(2) Need for establishing an O&M system during project implementation

This project took more than four years, from the completion of construction to the commencement of the operation. Considering that the O&M of telecommunication projects are often outsourced to external operators, when implementing similar ICT projects in the future, the project should consider including, as a project component, the establishment of an O&M framework that specifies marketing and other services to be outsourced and the criteria for selecting operators (e.g., including the selection and finalization of private contractors as part of the consulting service content).

(3) Need for setting indicators and target values in line with the project

The output of the project was the development of a subscriber network in Baghdad City. However, the target values for the operation and effect indicators set at the time of appraisal were based on the national values, and no target values were set for the project's target portion. To conduct an appropriate ex-post evaluation after the project completion, indicators and target values should be set in line with the substance of the project, and when outputs are modified during the project implementation, the indicators and target values should be revised accordingly.

(4) Good practices for smooth project implementation under unstable security conditions

When implementing an infrastructure development project in a country where the security situation is unstable, such as Iraq, main consultants are often unable to be stationed at the site. Under such circumstances, it is important to establish a procedure for obtaining accurate on-site information and a smooth system for implementing the project. Activities undertaken in this project included remote meetings and guidance by the main consultant and face-to-face discussions by JICA office staff with senior officials and staff of the executing agency, monitoring and follow-up support provided by another donor (the United Nations Development Program (UNDP)), regularly held meetings by a monitoring committee where all parties concerned including the recipient government and donors assembled, the development and use of an electronic approval and decision flow system, and system integration that was conducted remotely. These efforts are likely to be useful for other projects as a means of facilitating smooth implementation of projects under unstable conditions.

5. Non-Score Criteria

5.1 Performance

5.1.1 Objective Perspective

The project faced various difficulties, including the need to modify various outputs, unstable security conditions that forced the main consultant to conduct construction management remotely, and the fact that the operation of the facilities did not start promptly after the completion of the project. JICA managed to guide the project to its completion by performing appropriate project management, consulting with the executing agency, building effective cooperative relationships, and taking advantage of the UNDP's support on monitoring and follow-up activities. Therefore, although there was room for improvement in the initial output of the project, as stated above, it appears that JICA fulfilled its expected role as an agency involved in the project and contributed to the results.

5.1.2 Subjective Perspective

Various changes have occurred between the commencement of the project and its completion. In order to clarify the roles JICA and other stakeholders played and the contributions they made in the project in achieving the project objective in the face of these changes, interviews were conducted with former JICA Iraq Office staff, UNDP Iraq Office staff, and the main consultant who participated in the project. The following is a description of the project implementation from the viewpoints of these project stakeholders.

1) Initial Stage of the Project

After the commencement of the project, the exchange rate fluctuated drastically (the project cost decreased by about two-thirds from the time the loan agreement was signed), which necessitated a change in the project scope. Because the main consultant was managing the project remotely from Jordan (Amman) for security reasons, both MOC officials and JICA office staff traveled to Amman to review and adjust the project scope there. The coordination for this review and adjustment required considerable effort. In addition, due to the remote management by the main consultant, it was initially difficult for the consultant to communicate smoothly with the MOC. As a temporary solution, JICA office staff frequently visited the MOC and followed up on the communication between the MOC and the consultant to avoid a lag in the communication between them.

In addition, in terms of contract management, there were many direct contracts in Iraq at that time, and there were significant gaps between the contractual practice in Iraq and the rules in JICA guidelines and international bidding. For this reason, JICA office staff made efforts to understand the underlying background, including the reasons why the counterpart was insisting on the Iraqi-style practice, and carefully explained to the counterpart the procedure for international contracts

in an easy-to-understand manner, including the rationales behind the JICA guidelines and international bidding rules. By understanding the gaps and explaining these rules in detail, they were able to gain an understanding of their counterparts.

2) Mid-stage of the Project

During the construction period, construction work was delayed due to the failure to obtain construction permits on an account of deteriorating security conditions, delays in customs procedures, and the absence of systematic records of public service infrastructure, etc. In addition to meeting with MOC officials and monitoring progress, JICA office staff conducted regular consultations with the Minister and Undersecretary of the MOC, held regular meetings with the UNDP, which was monitoring the construction sites, and requested the Ministry of Finance to encourage the MOC to take action if progress was not being made.

The consultant also held weekly, monthly, and quarterly meetings, as well as irregular videoconferences, to monitor progress and resolve problems. However, there were still concerns that limited communication could slow down the progress of the construction work. Therefore, an electronic approval/decision flow system was developed to be used between the MOC, the consultant, and the contractor. In addition, Ericsson's US-based engineers were able to remotely access and configure equipment and integrate the system from outside the country, thereby improving the efficiency of the work.

3) Late Stage of the Project

After the construction work was completed, the operator remained unselected for a long time because Iraq still did not have a law with respect to PPP, and the facilities developed under this project remained unused for a long time. JICA office staff encouraged the MOC and the ITPC to proceed with the selection of an operator and to make use of the facilities by conducting tests and pilot operations until the operator is selected. In addition, at a training session conducted by the UNDP and a quarterly meeting of the monitoring committee, JICA office staff explained what would be necessary to establish an O&M system, the need to prepare manuals to ensure the successful operation of not only the equipment but also the entire system, and the need to clarify what and to what extent to outsource when outsourcing to the private sector. As a result, a test operation was conducted in 2019, and the service was preliminarily provided to about 1,000 to 2,000 subscribers; the JICA office requested progress reporting and maintained an oversight during the test operation. UNDP also continued to provide follow-up services.

Various activities and efforts by the parties involved in the project described above allowed the project to complete its work. At the time of the ex-post evaluation, the FTTH network development project is being expanded throughout Iraq based on the experience gained in this project.

5.2 Additionality

JICA Iraq Office signed a monitoring contract with UNDP Iraq Office. Accordingly, UNDP Iraq Office provided monitoring, follow-ups, and consultation support for all JICA projects being implemented in Iraq. In the early stages of the project, the UNDP provided coordination support between the MOC, the Ministry of Planning, and the Ministry of Finance, as the JICA office did not have national staff. In addition, due to frequent terrorist attacks and demonstrations in Baghdad after 2014, site visits and monitoring of the project site were conducted by the UNDP's local staff. In the latter stages of the project, since it took some time before an O&M system was established for this project, the UNDP also supported the monitoring of this effort.

In addition, the monitoring committee for all JICA projects in Iraq was held quarterly, where the Iraqi Prime Minister's Advisory Commission (PMAC), executing agencies, the Japanese Embassy, JICA, the UNDP, and others assembled to report on the progress of each project. At the committee, each project was asked to present the progress it made. This motivated each executing agency to move their project forward smoothly. The selection of committee members was also important, as some issues could be coordinated and resolved only from the perspective of the PMAC.

These efforts helped to facilitate the project implementation, and without them, the project period could have been extended even further. Therefore, these were value-adding initiatives in Iraq, where security concerns and other factors make it more challenging to implement projects.

(End)

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
1. Project Outputs	Construction of an IP communication system and 150,000-line subscriber network in Baghdad City (See “3.2.1 Project Outputs” for details)	Same as left (See “3.2.1 Project Outputs” for details)
Construction work and equipment procurement	Construction of outside plant maintenance centers in Basrah and Mosul Cities	Canceled
Consulting Services	Detailed design, equipment procurement support, construction supervision support, support for preparing O&M manuals, support for conducting training, etc. Total: 424 person-months	Detailed design, equipment procurement support, construction supervision support, support for preparing O&M manuals, support for conducting training, the study on the introduction of PPP, etc. Total: 596 person-months
2. Project Period	October 2012- May 2016 (44 months)	October 2012- December 2021 (111 months)
3. Project Cost		
Amount Paid in Foreign Currency	10,858 million yen	11,642 million yen
Amount Paid in Local Currency	1,963 million yen (27,570 million Iraq Dinar (IQD))	528 million yen (5,873 million IQD)
Total	12,821 million yen	12,170 million yen
ODA Loan portion	11,674 million yen	11,642 million yen
Exchange Rate	1IQD = 0.0712 yen (As of February 2011)	1IQD = 0.0899 yen (Average for 2012-2019)
4. Final Disbursement	September 2019	