

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 "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 | <p>[Grant Aid]</p> <ul style="list-style-type: none"> • The Project for Improvement of Trunk Communications Network (October 2004) • The Project for Improvement of Transit Switches (October 2004) <p>[The World Bank]</p> <ul style="list-style-type: none"> • 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

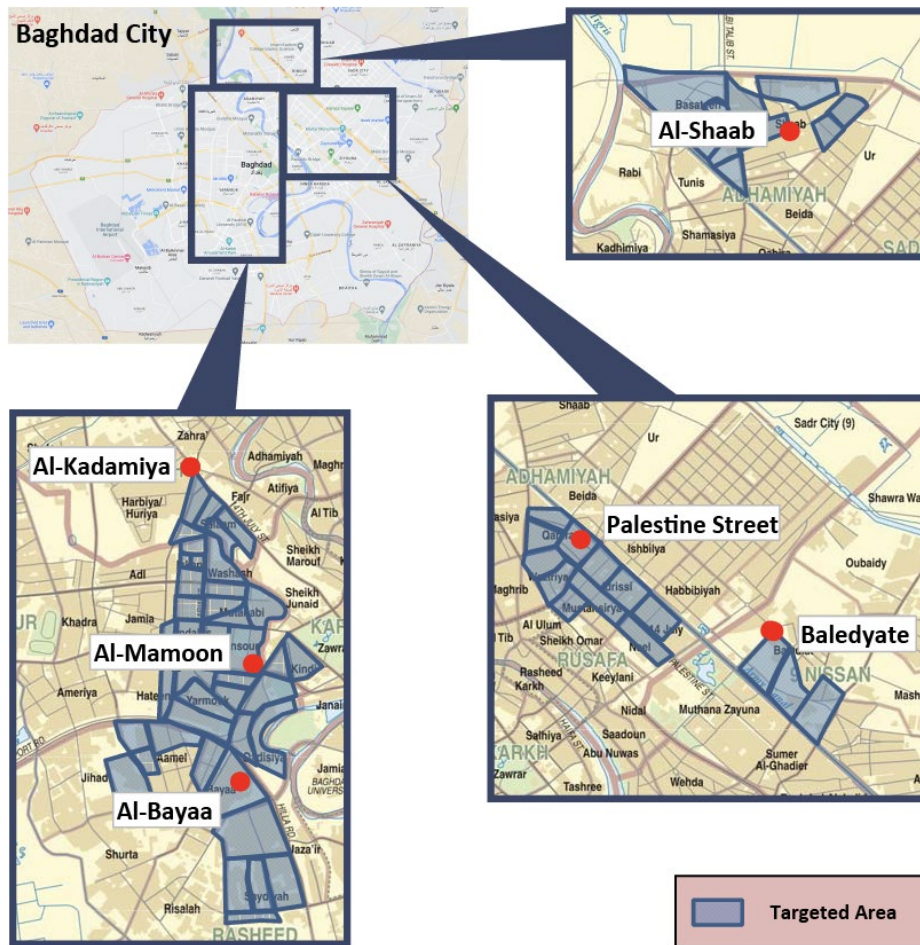
At the time of the appraisal, there were no specific plans for collaboration or coordination with projects implemented by other Japanese organizations or with assistance by other development cooperation organizations, including other donors, or the private sector.

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)

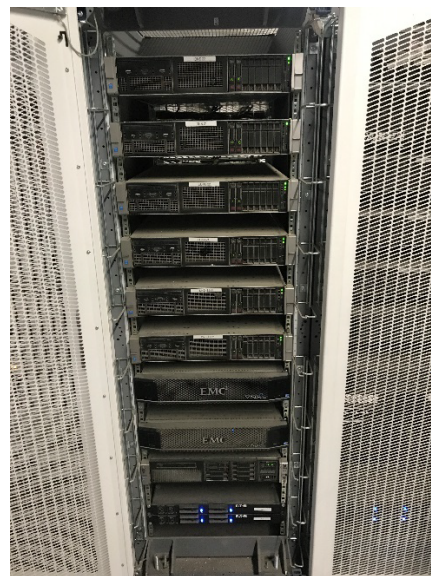


Photo 3: Part of IMS procured under the project
(Source: Ex-post evaluation team)

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

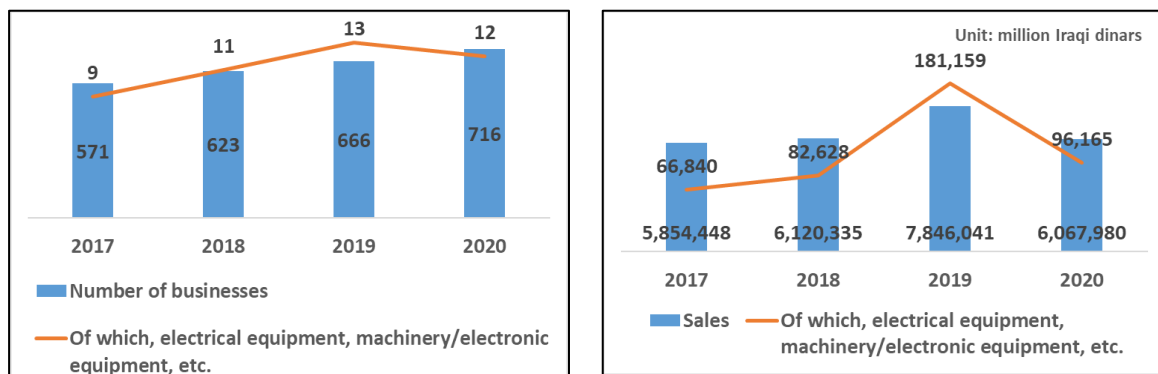
3.3.2.1 Intended Impacts

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

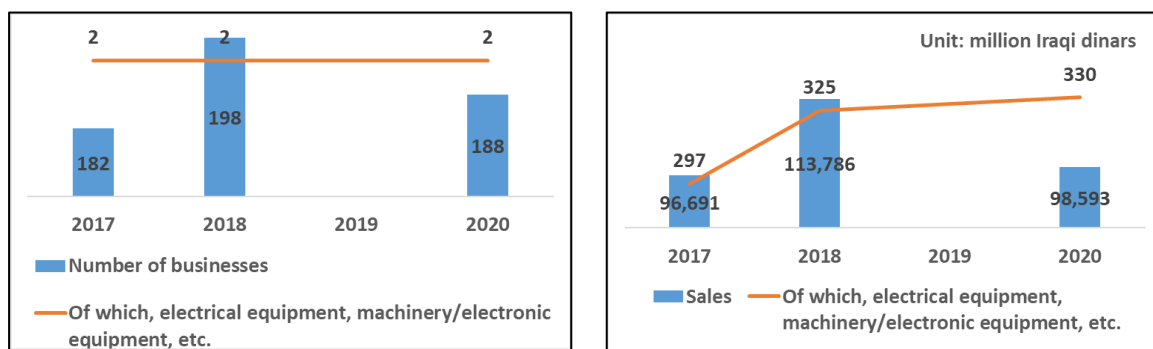
telecommunications equipment manufacturing industry have also increased). According to statistical data published by the CSO, the number of businesses, sales, and GDP in the manufacturing sector as a whole have been generally increasing in recent years, as shown in the figures below, with a particularly 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)

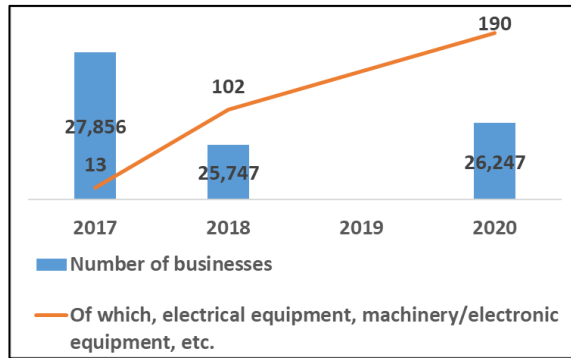


Source: CSO

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.

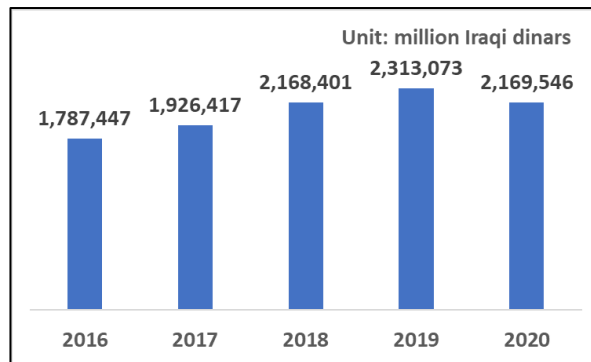


Source: CSO

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 | |