Ex-Post Project Evaluation 2020

Package Ⅲ - 5 (Viet Nam, Djibouti)

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JAPAN INTERNATIONAL COOPERATION AGENCY

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FY2020 Simplified Ex-Post Evaluation Report of Japanese ODA Loan Project

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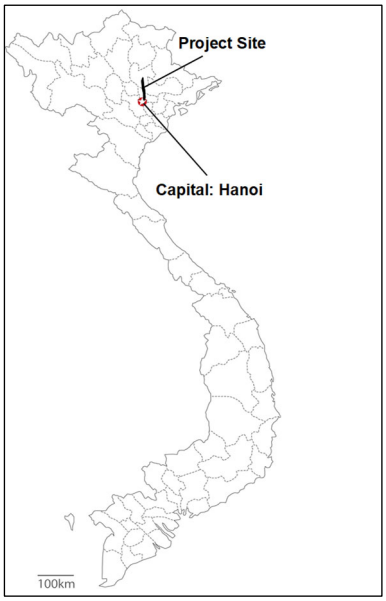
Duration of the Study: November 2020－January 2022
Duration of the Field Study: May 10, 2021－June 28, 2021

Country Name	**(ODA Loan) New National Highway No.3 and Regional Road Network Project (I) (II)**
Socialist Republic of Viet Nam	



Location of the project site

National Highway No. 3 constructed by the project

I. Project Outline

Background	National Highway No. 3, which runs between Hanoi and Thai Nguyen, is part of the major road network connecting Hanoi City and Thai Nguyen City with international logistics hubs such as Noi Bai International Airport, Hai Phong Port and Cai Lan Port in the northern part of Hanoi City. Thai Nguyen City, where National Highway No. 3 terminates, is located about 60 km to the north of Hanoi City. It is an emerging industrial city and is a key area for economic activities in the northern Vietnam. Before the project, driving safety on the existing National Road No. 3, however, was not fully secured and there were many traffic accidents, partly because of mixed traffic of large trucks and motorcycles on the road. Thus, there was an urgent need for the construction of an automobile expressway, which would divert the traffic volume and contribute to the safety of local residents. As there were some poor areas along the existing National Road No. 3, the project was also expected to improve the livelihood of local residents, including the poor, by improving their access.
Objectives of the Project	The objective of the project was to cope with increasing traffic volume and to improve accessibility and safety for the road users by constructing a bypass road (high-standard road) of National Highway No. 3 and improving the related feeder roads in northern Vietnam, thereby contributing to the promotion of economic and social development for the region, promotion of economic growth and strengthening of international competitiveness of Vietnam.
Contents of the Project	1. Project Site: Northern part of Hanoi (About 60 km from Hanoi City to Thai Nguyen City, Thai Nguyen Province) 2. Japanese side 1) Civil works, procurement of equipment, etc. ・ Construction of a new National Highway No. 3 high-standard road (about 60 km) from Hanoi City to Thai Nguyen Province ・ Improvement of feeder roads that contribute to poverty reduction and construction of interchanges connecting high-standard road with related feeder roads and the existing national roads. ・ Construction of Michi no Eki (rest facilities) ・ Traffic safety measures (intersection improvement, installation of traffic safety facilities such as reflective road studs and traffic signs, etc.) ・ Introduction and installation of maintenance equipment for high-standard road (information and communication equipment, inspection and road maintenance vehicles, etc.) and toll plaza and Intelligent Transport System (hereinafter referred to as “ITS”) 2) Consulting services ・ Detailed design, tender assistance and construction supervision ・ Technical support for operation and maintenance of automobile expressway ・ Preparation of draft operational implementation plan of Michi no Eki ・ Implementation of safety measures for construction ・ Implementation of HIV/AIDS countermeasures for construction workers, etc. 3. Vietnamese side: ・ Land acquisition, resettlement, etc.

Implementation Schedule	E/N Date	March 31, 2005 (Phase I) March 30, 2012 (Phase II)	Disbursement Date	July 29, 2013 (Phase I) July 29, 2019 (Phase II)
	L/A Date	March 31, 2005 (Phase I) March 30, 2012 (Phase II)	Completion Date	January 2014 (At the start of facility operation)
Project Cost	Total Project Cost (Planned): 35,357 million yen Loan Approved Amounts: 12,469 million yen (Phase I), 16,486 million yen (Phase II) Disbursed Amounts: 12,415 million yen (Phase I), 16,379 million yen (Phase II)			
Executing Agency	Ministry of Transport (MOT)			
Conditions (Loan only)	• (Phase I) Interest Rate: 1.3%, Repayment Period: 30 year (of which, Grace Period: 10 years), General Untied • (Phase II) Interest Rate: 1.4% (Consulting Services: 0.01%), Repayment Period: 30 year (of which, Grace Period: 10 years), General Untied			
Borrower (Loan only)	The Government of the Socialist Republic of Viet Nam			
Contracted Agencies	Main Contractors: Truong Son Construction Corp. (Vietnam) / Vinaconex (Vietnam), Thang Long Construction Corporation (Vietnam) / Civil Engineering Construction Corporation No.8 (Vietnam) / Civil Engineering Construction Corporation No.1 (CIENCO 1) (Vietnam) (JV), Thang Long Construction Corporation (Vietnam) / Civil Engineering Construction Corporation No.8 (Vietnam) / Truong Son Construction Corp. (Vietnam) / Vietnam Construction & Import-Export Corporation (Vietnam) / Vinaconex (Vietnam) (JV), Thang Long Construction Corporation (Vietnam) / Civil Engineering Construction Corporation No.8 (Vietnam) (JV) Main Consultants: Nippon Koei Co., Ltd. (Japan) / Japan Bridge & Structure Institute, Inc. (Japan) (JV) Agent: N.A.			

II. Result of the Evaluation

Summary

This project newly constructed a bypass road (high-standard road) of National Highway No. 3 connecting Hanoi City and Thai Nguyen City and feeder roads with the aim of coping with the increasing traffic volume of the existing National Road No. 3 and improving accessibility and safety for the road users. The project, which aims to improve the efficiency of logistics in the northern region of Hanoi and contribute to the improvement of livelihoods of local residents, including the poor, is consistent with Vietnam's development policy, development needs and Japan's ODA policy which puts up supporting the development of economic and social infrastructure. Therefore, the relevance of the project is high. In terms of project implementation, although the project period was within the plan, the project cost exceeded the plan. Therefore, the efficiency of the project is fair. As for project effects, the project has shortened the travel time and reduced the travel cost. The actual traffic volumes of each of the existing National Road No. 3 and the new National Highway No. 3 developed by the project were slightly lower than 80% of the target. This is mainly due to the fact that the shift of traffic volume to the new National Highway No. 3 was not as much as initially expected, as the existing National Road No. 3 was upgraded and improved separately by the Vietnamese side to improve its convenience, as well as the extension plan of the new National Highway No. 3 to the northern region was delayed and the road network leading to the region is not yet developed, thus the traffic volume has not increased as much as expected. From the results of interviews with road users and local residents, it was confirmed that the project has increased the efficiency of logistics and improved the livelihood of local residents. In addition, the project has contributed to the promotion of economic and social development in the northern region of Vietnam. Therefore, the project has mostly achieved its objectives and the effectiveness/impact of the project is high. No negative impacts on natural environment have been reported, and resettlement and land acquisition process has been carried out appropriately in accordance with the relevant regulations of Vietnam, thus, no problem has been seen. Regarding operation and maintenance, no major problem has been observed in the institutional/organizational, technical and financial aspects of operation and maintenance as well as in the current status. In addition, roads are well maintained and operated in good condition. Therefore, the sustainability of the project effects is high.

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

Overall Rating[1]	**A**	**Relevance**	**③**[2]	**Effectiveness & Impact**	**③**	**Efficiency**	**②**	**Sustainability**	**③**

<Special Perspectives Considered in the Ex-Post Evaluation/Constraints of the Ex-post Evaluation>

In this study, due to the global spread of COVID-19, the external evaluator could not travel to Vietnam. Instead, the local consultant was utilized remotely to visit the project site to conduct the actual inspection, information and data collection, and interviews with project related personnel, etc. For this reason, the external evaluator could not directly visit the site to check the outputs or conduct interviews with stakeholders and beneficiaries, etc. and thus conducted the evaluation analysis and judgment by closely examining the information and data obtained through the remote surveys.

1 Relevance

<Consistency with the Development Policy of Vietnam at the Time of Ex-Ante Evaluation>

(Phase I) In the *Socio-Economic Development 10-year Strategy (2001-2010)*, the Vietnamese government set forth the linkage between development and poverty reduction, and ensuring sustainable economic growth focusing on economic development centers. The project was also planned as one of the high-standard road development network in the *Road Development Master Plan to 2010 and Orientation Up to 2020*.

(Phase II) In the *Ninth Social Economic Development Five-Year Plan (2011-2015)*, the Vietnamese government indicated the further

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

[2] ③: High, ②: Fair, ①: Low

development of infrastructure system, including the improvement of transportation infrastructure, as the most important issue for sustainable development under high growth. In particular, with regard to the expressways, including the high-standard road constructed by the project, the *Master Plan for Expressways until 2020 and Vision after 2020* (Prime Minister's Decision No. 1734, December 1st, 2008) was formulated and priority was given to the development of the expressways. In addition, the target section of the project (between Hanoi and Thai Nguyen) was considered as a priority section in the target region's transportation sector development plan, *Plan for Transport Development in the Northern Economic Priority Areas until 2020 and Directions until 2030* (Prime Minister's Decision No. 5, January 24th, 2011).

<Consistency with the Development Needs of Vietnam at the Time of Ex-Ante Evaluation>

The existing National Highway No. 3 is close to Noi Bai International Airport, and with development plans such as Soc Son Industrial Park and Thai Nguyen City Plan, rapid increase in traffic volume was expected to continue. In addition, the existing National Road No. 3 was not fully safe enough partly due to mixed traffic of large trucks and motorcycles on the road, resulting in many traffic accidents. Therefore, there was an urgent need for the construction of automobile expressway, which would divert the traffic volume and contribute to the safety of local residents. In addition, since there were poor areas along the existing National Road No. 3, the project was also expected to improve the livelihood of local residents, including the poor, by improving their access.

<Consistency with Japan's ODA Policy at the Time of Ex-Ante Evaluation>

(Phase I) In the Japanese government's *Country Assistance Program for Vietnam* (April 2004), emphasis was placed on support for international and domestic trunk line transportation (northern and southern economic growth priority areas and north-south trunk line) and urban transportation (Hanoi City and Ho Chi Minh City). In addition, *Overseas Economic Cooperation Operations* of JICA (then JBIC) stated that it would provide support for the development of economic and social infrastructure and technical cooperation for the improvement of operation and maintenance systems after the completion of projects. It also stated that JICA would strengthen its response to poverty alleviation measures. Furthermore, the *Country Assistance Strategy* indicated that JICA would support the development of road network in the northern region of Hanoi.

(Phase II) The Japanese government's *Country Assistance Program for Vietnam* (July 2009) stated that it would consider appropriate priorities and roadmaps with regard to intercity trunk transportation networks, and provide support that takes into account selection and concentration. In addition, JICA has identified the development of trunk transportation network as priority, and indicated that it would promote the development of physical infrastructure as well as put emphasis on human resource development and quality assurance, etc. for operation and maintenance of the increasing transportation infrastructure assets.

<Evaluation Result>

In light of the above, the relevance of the project is high.

2 Effectiveness/Impact

<Effectiveness>

(Quantitative Effects)

At the time of the ex-ante evaluation, "annual average daily traffic (vehicle)," "travel time saving (minutes/vehicle)," and "travel cost saving (Vietnamese Dong (hereinafter referred to as "VND")/year)" were set as quantitative effects of the project. Table 1 summarizes the baselines, the targets, and the actual figures for each indicator measured and calculated under the same conditions at the time of the ex-ante evaluation. As the project completion is in January 2014 (at the start of facility operation), the target year to be compared is 2016, which is 2 years after completion.

- Annual average daily traffic: The actual figures for 2016 are 5,000 vehicles for the existing National Road No. 3 and 20,100 vehicles for the new National Highway No. 3, with achievement rates of 78% and 75%, respectively. The reasons why the achievement rates were slightly below 80% are that (1) the existing National Road No. 3 was upgraded and enhanced separately by the Vietnamese side to improve its convenience, and the shift in traffic volume was considered to be less than initially expected, and (2) the extension plan of the new National Highway No. 3 to the northern region of Vietnam is delayed and the road network connecting the northern region of Vietnam is not yet developed and thus the traffic volume is considered not to have increased as much as expected. According to the executing agency, a section connecting Thai Nguyen Province and Cho Moi District in Bac Kan Province (about 40.3 km) is planned to be constructed under the BOT scheme[3] after 2021.
- Travel time saving: Judging from the project objective, the goal of the project is to reduce travel time required for the existing National Road No. 3 before and after the new National Highway No. 3 is put into service. The actual travel time reduction of the existing National Road No. 3 in 2016 was 22 minutes and 38 seconds,[4] and the achievement rate is 100%.
- Travel cost saving: In 2016, the actual figure was 247.37 billion VND, which is 101% of the target (245 billion VND).

[3] A BOT scheme (Build, Operate and Transfer Scheme) is a scheme in which private operators raise its own funds, build, operate and manage facilities for a certain period of time, and then transfer the ownership at the end of the period.

[4] The reduced time of 22.63 minutes (in decimal notation) in Table 1 is converted to minutes and seconds in sexagesimal notation.

Table 1: Quantitative effects of the project

Indicators	Baseline 2004 Baseline Year	Target 2016 2 Years after Completion	Actual 2016 (Note 1)
Annual average daily traffic (vehicle) (at KM33+500 point) (Note 2)	(existing National Road No. 3) 6,113	(existing National Road No. 3) 6,400 (new National Highway No. 3) 26,800	(existing National Road No. 3) 5,000 (new National Highway No. 3) 20,100
Travel time saving (minutes/vehicle)	(existing National Road No. 3) － (actual travel time is 86.55 minutes)	(existing National Road No. 3) 22.63 (=86.55-63.92) (target travel time is 63.92 minutes)	(existing National Road No. 3) 22.63 (=86.55-63.92)
Travel cost saving (VND/year) (Note 3)	－	245 billion	247.37 billion

Source: Ex-ante evaluation report for Phase II project and results from questionnaire survey of the executing agency

Note 1: As the project completion is in January 2014 (at the start of facility operation), the target year to be compared is 2016 (2 years after completion).

Note 2: KM indicates the point in terms of distance from Hanoi (KM0).

Note 3: Benefits of vehicle operating cost savings and benefits of passenger travel time savings. Over the total project life (30 years), the ratio of vehicle operating cost savings benefits and passenger travel time saving benefits is almost 50/50 (50.3% : 49.7%).

(Reference Data)

As the actual data for 2019 and 2020 for the above indicators were obtained in the survey, they are shown in the table below as reference data. The reason for regarding the data as reference is that the data was not collected under the same conditions as those set at the time of the ex-ante evaluation, making it difficult to analyze the trends in a consistent manner.

- Annual average daily traffic: Traffic volumes on the new National Highway No. 3 show a decreasing trend compared to 2016, which may be due to the fact that the data was not collected under the same conditions as those set at the time of the ex-ante evaluation, as described above, and also due to travel restrictions caused by measures against COVID-19. Traffic volumes on the existing National Road No. 3 show an increasing trend compared to 2016, but again the data was not collected under the same conditions as set at the time of the ex-ante evaluation. While there may have been some effects of travel restrictions due to measures against COVID-19, the degree of impacts may have been relatively small because the road is more closely connected to the daily lives of local residents.
- Travel time saving: There were no factors that would cause significant changes in the travel time on the existing National Road No. 3 in 2019 or 2020, and the figures are unchanged. Travel time on the new National Highway No. 3 was actually measured by the local consultant in May 2021, and it was about 40 minutes. (The legal maximum speed of the new National Highway No. 3 is 100 km/h.) It is a time saving of 46 minutes and 33 seconds[5] compared to the actual time of the existing National Road No. 3 in 2004 (86.55 minutes) as shown in Table 1.
- Travel cost saving: Benefits of vehicle operating cost saving and benefits of passenger travel time saving have increased and are both higher than the actual figures for 2016.

Table 2: Reference data for quantitative effects

Indicators	Actual	
	2019	2020
Annual average daily traffic (vehicle) (Note 1) (Note 2)	(existing National Road No. 3) 7,959 (new National Highway No. 3) 11,437	(existing National Road No. 3) 9,225 (new National Highway No. 3) 11,601
Travel time saving (minutes/vehicle) (Note 3)	(existing National Road No. 3) 22.63	(existing National Road No. 3) 22.63
Travel cost saving (VND/year)	301.7 billion	322.36 billion

Source: Results from questionnaire survey of the executing agency

Note 1: The measurement point on the existing National Road No. 3 is KM91+850. The point is not on the existing National Road No. 3 between Hanoi and Thai Nguyen, but almost at the midpoint between Thai Nguyen and Cho Moi, which is north of Thai Nguyen.

Note 2: The measurement point on the new National Highway No. 3 is KM 16+900. The point is at the intersection with the National Highway No. 18, which is 16.6 km south of KM 33+500, closer to Hanoi.

Note 3: The figures for 2019 and 2020 are the travel time savings calculated using the same figures based on the recognition that travel would be possible at the actual travel speed measured in 2016. Travel time for the new National Highway No. 3 measured by the executing agency was 45 minutes (2019 and 2020), which is 41 minutes and 33 seconds[6] shorter than the actual time for the existing National Road No. 3 in 2004.

[5] The reduced time of 46.55 minutes (in decimal notation) is converted to minutes and seconds in sexagesimal notation.

[6] The reduced time of 41.55 minutes (in decimal notation) is converted to minutes and seconds in sexagesimal notation.

(Qualitative Effects)

"Improvement of efficiency of passenger and cargo transportation by reducing congestion on the existing national road" and "improvement of living environment of local residents by reducing poverty and traffic accidents, etc." were set as qualitative effects of the project.

As a result of interviews with road users and local residents,[7] all respondents said, "The existing national road was congested and crowded before the project, but as a result of the project, a new national highway became available, and traffic on the existing national road was diverted to the new national highway, which has eased traffic congestion and improved the efficiency of passenger and cargo transportation."[8] Respondents also supported the fact that the project has contributed to the increased employment opportunities and income for the local residents. For example, taxi drivers and local residents said, "The economy along the road has been revitalized due to the development of industrial parks, etc. and travel to Hanoi has become easier. Local residents have also increased the source of income." "The use of new national highway has made our travel much smoother." "We are very satisfied with the project as it has reduced the travel time and saved fuel." Furthermore, the respondents indicated that the project has reduced the number of traffic accidents and improved safety and safe driving. For example, truck and bus drivers responded, "I feel that traffic accidents have been reduced because the new national highway constructed by the project has eased congestion on the existing national road," and "I often drive on the new national highway at night and I can drive with confidence because traffic safety facilities such as reflective road studs and traffic signs have been installed."

<Impacts>

(1) Promotion of Economic Development in the Areas Surrounding Hanoi City

"Promotion of economic development in the areas surrounding Hanoi City" was regarded as the expected impacts of the project. In interviews with the executing agency and road users,[9] the following comments were made. "The establishment of interchanges with feeder roads and the existing national roads by project has improved the road network along the project by connecting the old National Road No. 3 and the new National Highway No. 3, as well as the National Highway No. 1, the National Highway No. 18, the Provincial Highway No. 296, and the Thai Nguyen Bypass, etc. In addition, access between the northern area of Hanoi and international logistics hubs such as Noi Bai International Airport, Hai Phong Port, and Cai Lan Port has been improved." In addition to the road users mentioned above, the results of interviews with the Department of Transport, Thai Nguyen Province and the People's Committee of Pho Yen District in Thai Nguyen Province, where the new National Highway No. 3 passes through, showed that all the respondents agreed that after the project, industrial parks and commercial areas have been developed along the new national highway and logistics have become more active, promoting the development of the local economy. According to the Transportation Department of the Thai Nguyen Provincial People's Committee, Pho Yen District was mainly a rural area before the project, but large industrial estates such as Yen Binh, Dien Thuy, and Song Cong have been built in the area, and after the development of the new national highway, industries has developed, and the project has greatly contributed to increasing the Province's income.

It is difficult to verify direct correlation with the project since economic development is also affected by factors other than the project. However, in order to confirm the assumptions made at the time of the ex-ante evaluation, the trends of Gross Regional Domestic Product (hereinafter referred to as "GRDP") growth rates, industrial production and Foreign Direct Investment (hereinafter referred to as "FDI") after the project in Hanoi City, Thai Nguyen Province and Bac Ninh Province where the new National Highway No. 3 and the existing National Road No. 3 pass are shown in the tables below.

Table 3: Trend of GRDP growth rates

(Unit: % (2010 Standard))

	2015	2016	2017	2018	2019
Hanoi City	9.2	7.2	7.4	7.2	7.6
Thai Nguyen Province	33.2	16.4	12.8	10.4	9.0
Bac Ninh Province	8.9	6.2	19.1	11.3	1.1

Source: Statistics Offices in Hanoi City, Thai Nguyen Province and Bac Ninh Province

Table 4: Trend of industrial production

(Unit: indexed using 2010 figures as 100)

	2015	2016	2017	2018	2019 (Note)
Hanoi City	108.3	107.3	115.9	115.8	117.5
Thai Nguyen Province	176.0	123.7	208.2	197.3	195.5
Bac Ninh Province	112.0	105.1	151.8	120.3	99.2

Source: General Statistics Office of Vietnam

Note: Preliminary figures

[7] The breakdown of the interviewees is as follows.

- Road users (7 people): 2 taxi drivers, 2 truck drivers, 1 bus driver, 1 company car driver, and 1 seller.
- Local residents (2 people): 2 residents who had to resettle due to the project.

[8] Specifically, there were following responses.

- Before the project, it took about 20 minutes to travel from Da Phuc District to Pho Yen District (about 10 km) using the existing national road, but after the project, the congestion on the existing national road was eased and the same section can be traveled in 15 minutes. (seller)
- Before the project, it took three and a half hours to travel from Hanoi City (center) to Thai Nguyen using the existing national road, but after the project, it takes only one and a half hours using the new national highway. (taxi driver)
- Before the project, it took one hour to travel from Samsung Electronics Thai Nguyen Factory to Soc Son District (about 45 km) using the existing national road, but after the project, it takes only 30 minutes using the new national highway. (taxi driver)
- Before the project, it took two hours to travel from Tan Long District to Hanoi (about 70 km) using the existing national road, but after the project, it now takes one and a half hours using both the new national highway and the existing national road. (truck driver)

[9] The interviewees are the same as the interviewees listed in Footnote 7.

Table 5: Trend of FDI

(Unit: million USD)

	2015	2016	2017	2018	2019
Hanoi City	1,400	2,800	2,669	7,501	8,400
Thai Nguyen Province	200	132	16	387	368
Bac Ninh Province	3,574	912	3,491	1,443	1,696

Source: Statistics Offices in Hanoi City, Thai Nguyen Province and Bac Ninh Province

All figures are not necessarily on the steady increase, however, based on the above interview results, it can be assumed that the project has contributed to the economic development to some extent.

(2) Other Positive and Negative Impacts

① Impacts on the Natural Environment

The project is a large-scale road development project and classified as category A in the *JBIC Guidelines for Confirmation of Environmental and Social Considerations* (April 2002). The Environmental Impact Assessment (EIA) report for the project has been approved by the Ministry of Natural Resources and Environment in September 2004. The executing agency prepared and implemented the environmental management plan in accordance with the EIA during the project, and conducted environmental monitoring based on the plan. According to the executing agency and the Japanese consultant in charge of construction supervision, environmental monitoring of air quality, water quality, noise, vibration, waste, etc. was conducted every three months during the project. As a result, air quality and noise exceeded the standards partially, but mitigation measures such as watering the construction site and planting trees were taken, and overall there were no major problems.

Clams were made that the houses of 27 households in Pho Yen District, Thai Nguyen Province, were cracked due to vibrations during construction, but after discussions with the Thai Nguyen National Assembly Delegation, repair work was carried out and the problem was resolved. When checked with the People's Committee of the Pho Yen District, the restoration work was conducted after consultants were hired to conduct a validation survey. People's Committee of the District told that they prepared records related to the case and that the problem was resolved.

According to the executing agency and the Japanese consultant in charge of construction supervision, since the new National Highway No. 3 was constructed away from the residential areas, soundproof walls were not installed. They also said that there were no major complaints from the residents. In addition, as a result of interviews with road users and local residents, it was confirmed that there were no particular indications of negative impacts on the natural environment during and after the project.

② Impacts on the Social Environment (Land Acquisition and Resettlement)

As a result of the project, 5,239,371m^2 of land acquisition has taken place and 695 households have involuntarily resettled. According to the executing agency, land acquisition and resettlement was carried out by the District People's Committees in accordance with the Vietnamese national procedures and resettlement plan. In acquiring the land, the road alignment was adjusted to minimize impacts on historic sites, temples and other religious sites, and elementary schools. Regarding resettlement, public hearings, consultations, and negotiations on the amount of compensation have been conducted successively. Although it took some time to reach agreements on the amount of compensation and contents of support with some residents, consensus was reached through discussions and no complaints were reported. In Hanoi, residents who have given up their agricultural land have been provided with job training and compensation equivalent to 5 times the price of their agricultural land.

The District People's Committees were also in charge of developing basic infrastructures (water, electricity, etc.) at the resettlement site. Consideration was given to minimize negative impacts, such as relocating the entire community to the same site.

According to the executing agency, the resettled residents are basically satisfied with the infrastructure and the living environment at the resettlement site, and there have been no complaints. In particular, Ninh Hiep Commune in Hanoi is a very developed area with business activities and has the same values as the neighboring urban areas, and indicated that the level of satisfaction of the resettled residents is particularly high.

According to the People's Committee of Pho Yen District, Thai Nguyen Province, where 200 households have involuntarily resettled, resettlement was carried out in accordance with the Vietnamese national procedures and the resettlement action plan, and no particular problems have occurred. In addition, the resettlement site has basic infrastructure in place with good living environment, and there have been no complaints from the residents.

As a result of interviews with 2 resettled residents living in the Cong Moi Area (one of whom was in charge of communication, coordination, and negotiation with the District People's Committee as a representative of the resettled residents), there were no particular problems with the resettlement process, the amount of compensation, or the state of infrastructure in the resettlement area. There were no complaints from the residents and they were satisfied with their living environment. After resettlement, about 80% of the residents have changed their means of livelihood from farming to trading, and their livelihood has at least recovered compared to the situation before the resettlement. The area is home to the Samsung Electronics Thai Nguyen Factory, and many residents have entered into rental businesses to earn rental income.

③ Other Impacts: Measures Against HIV/AIDS Infection for Construction Workers, etc.

During the construction period, HIV/AIDS prevention programs were conducted, led by the consultant in charge of construction supervision in collaboration with the executing agency. According to the consultant in charge of construction supervision, HIV/AIDS testing was conducted regularly every 6 months for all construction-related personnel, and education and awareness raising activities were also carried out. As a result, awareness of people concerning HIV/AIDS countermeasures increased and the program turned out to be effective.

<Evaluation Result>

As quantitative effects of the project, three indicators of "annual average daily traffic," "travel time saving" and "travel cost saving" were set at the time of the ex-ante evaluation. At the time of the ex-post evaluation, travel time saving and travel cost saving have reached the targets. The annual average daily traffic was slightly lower than 80% of the target, but this is mainly due to the fact that the shift of traffic volume to the new National Highway No. 3 was not as much as initially expected, as the existing National Road No. 3 was upgraded and improved separately by the Vietnamese side to improve its convenience, and the extension plan of the new National Highway No. 3 to the northern region was delayed and the road network leading to the region is not yet developed, thus the traffic volume has not increased as much as expected. From the results of interviews with road users and local residents, it was confirmed that the project has increased the efficiency of logistics and improved the livelihood of local residents. In addition, the project has contributed to the promotion of economic and social development in the northern region of Vietnam. Therefore, the project has mostly achieved its objectives and the effectiveness/impact of the project is high.

3 Efficiency

<Outputs>

Since the project is a sliced project[10] for which the ODA loan was provided into phases I and II, in the analysis of efficiency, the entire project was considered as one project, and the project scope (outputs) was analyzed as a whole to make evaluation decisions.

A comparison of the planned and actual major outputs of the project is shown in Table 6. Construction of the Michi no Eki (rest facilities), introduction and installation of maintenance equipment for high-standard road (information and communication equipment, inspection and road maintenance vehicles, etc.), and toll plaza and ITS facilities were excluded from the scope of the project. This was the Vietnamese side's response to the shortage of the ODA loan funds due to the sharp rise in the prices of construction materials and equipment and the depreciation of the yen during the project period. The executing agency notified JICA Vietnam Office that it would exclude these items from the project scope and consider their development under the BOT scheme.[11] In response to this, JICA agreed with this as a result of examining the policy based on the consistency and legality with the Japanese government's grant policy and the ODA loan agreement. In addition, although the development of the excluded scope by the BOT scheme is not subject to JICA's concurrence, JICA required the Vietnamese side to provide information. Therefore, the exclusion of some scope was a modification in response to the changes in various conditions during the project, and JICA agreed to the scope change after confirming that (1) the scope change did not violate the project purpose of the loan agreement, (2) consistency with the Japanese government's grant policy is maintained even after the scope change and (3) the scope change relates to the road ancillary structures, and it does not correspond to a fundamental change to the project. In light of the above, it can be considered that the changes were reasonable.

Table 6: Comparison of planned and actual major outputs

Plan	Actual (Comparison)
Civil works, procurement of equipment, etc.	
Construction of a new high-standard road (about 60 km) of National Highway No. 3 from Hanoi City to Thai Nguyen Province.	As planned.
Improvement of feeder roads that contribute to poverty reduction and construction of 6 interchanges between high-standard road and feeder roads or the existing national roads.	As planned.
Construction of Michi no Eki (rest facilities)	Excluded from the project.
Traffic safety measures (intersection improvement, installation of traffic safety facilities such as reflective road studs and traffic signs, etc.)	Mostly as planned. (The intersection improvement was planned as plane intersection, but was changed to three-dimensional intersection.)
Introduction and installation of maintenance equipment for high-standard road (information and communication equipment, inspection and road maintenance vehicles, etc.), toll plaza and ITS	Excluded from the project.
Consulting services	
Detailed design, tender assistance and construction supervision	As planned.
Technical support for the operation and maintenance of automobile expressway	As planned.
Development of draft operation implementation plan of Michi no Eki	As planned.
Implementation of safety measures for construction	As planned.
Implementation of HIV/AIDS measures for construction workers, etc.	As planned.

Source: Results from questionnaire survey of the executing agency and interview with the Japanese consultant in charge of construction supervision

<Inputs>

The total project cost was initially planned to be 35,357 million yen (out of which 28,955 million yen was to be covered by the Japanese ODA loan). In actuality, the total project cost was 40,764 million yen (out of which 28,794 million yen was covered by the Japanese ODA loan), which exceeded the plan (115% of the planned amount). This was due to the significant increase in project cost caused by the sharp rise in the prices of construction materials and equipment as well as the effects of the yen's depreciation. According to the executing agency, between 2011 and 2013, cement price increased by 65%, diesel price increased by 98%, steel price increased by 65%, and asphalt price

[10] For large-scale projects, projects are divided into phases by period and are implemented in accordance with their progress.

[11] At the time of the ex-post evaluation, the ITS and toll collection systems were not in place, and there was no concrete prospect of the BOT project by the Vietnamese side. According to the executing agency, in the National Assembly Standing Committee's Resolution dated October 21, 2017 (No. 437/NQ-UBTVQH14), the project implementation policy using the BOT scheme was reviewed, and in response, Document No. 1284/ TTg-CN on suspension of implementation under the BOT scheme was issued on September 21, 2018. On the other hand, for the Michi no Eki, it was agreed between the executing agency and the People's Committee of Thai Nguyen Province to build and develop Hai Dang Station at KM 36. Michi no Eki has been in operation since March 2019.

increased by 86%. The depreciation of the Japanese yen against the local currency VND[12] was also a factor in the increase in project cost. Therefore, although some project scope was excluded as a countermeasure to the significant increase in project cost, the total project cost exceeded the plan due to the factors that increased the cost beyond that.

Project period (from signing of loan agreement of Phase I to the start of facility operation) was planned to be from March 2005 to April 2014 (110 months), but in actuality, it was from March 2005 to January 2014 (107 months), which was within the plan (97% of the initial plan). In reality, there were delays of about 28 months in the selection of contractors[13] and about 35 months in the land acquisition and resettlement. However, these delays did not affect the project period because the project completion was defined as "at the start of facility operation." Specifically, the opening ceremony of the project was conducted in January 2014 (soft opening), and the high-standard road of National Highway No. 3 started its service. According to the executing agency and the Japanese consultant in charge of construction supervision, the process of land acquisition and resettlement continued until February 2015, after the facility was put into service, and the construction of guardrails and other facilities were not completed at the start of facility operation.[14]

It should be noted that the excluded scope from the project were all related to the ancillary structures of the road, and not related to the basic scope of "construction of a new high-standard road (about 60 km) of National Highway No. 3 from Hanoi City to Thai Nguyen Province." Therefore, the scope reduction did not affect the timing of the start of facility operation.

Table 7: Comparison of planned and actual project period for each item

Item	Plan	Actual
Consulting services	October 2005–July 2014 (106 months)	November 2005–December 2015 (122 months)
Selection of contractors	October 2006–June 2007 (9 months)	January 2007–January 2010 (37 months)
Civil works	July 2007–April 2014 (82 months)	December 2009–January 2014 (50 months)
Start of operation of facilities	April 2014	January 2014
Land acquisition	July 2005–March 2012 (81 months)	July 2005–February 2015 (116 months)

Source: Information provided by JICA, project completion report, results from questionnaire survey of the executing agency, and interview with the Japanese consultant in charge of construction supervision

Note 1: The start of the consulting services (plan) is the start time set at the time of Phase 1 planning (October 2005), and the end is the closing time set at the time of Phase 2 planning (July 2014).

Note 2: Selection of contractors (plan) is the planned schedule at the time of Phase 1 planning.

Note 3: The start of the civil works (plan) is the start time set at the time of Phase 1 planning (July 2007), and the end is the closing time set at the time of Phase 2 planning (April 2014).

Note 4: The start of the land acquisition (plan) is the start time set at the time of Phase 1 planning (July 2005), and the end is the closing time set at the time of Phase 2 planning (March 2012).

< Internal Rates of Return (Reference only)>

The Economic Internal Rate of Return at the time of the appraisal was 8.5%, calculated on the assumption that travel time saving and travel cost saving to be considered as benefits, project cost (excluding tax) and operation and maintenance cost to be regarded as costs, and project life assumed to be 30 years. As a result of recalculation at the time of the ex-post evaluation, it turned out to be 3.1% which is lower than the figure at the time of the appraisal. The main reasons for this are that in addition to the increase in project cost compared to the original plan, the increase in traffic volume was lower than expected due to the delay in the extension of the New National Highway No. 3 to the northern provinces of Bac Kan and Cao Bang, and because the existing National Road No.3 was improved separately by the Vietnamese side to increase convenience, and hence, the shift in traffic volume did not occur as much as initially expected.

Unlike the original plan, since the project is no longer a toll road, the Financial Internal Rate of Return was not calculated.

In light of the above, although the period was within the plan, the project cost exceeded the plan. Therefore, the efficiency of the project is fair.

4 Sustainability

<Institutional/Organizational Aspect>

The operation and maintenance of the national highway constructed by the project is carried out by Joint Stock Company No. 238 and Bac Nam Joint Stock Company, which are the maintenance companies.[15] Both companies are undertaking operation and maintenance work based on the contract with the Road Administration Department I under the Directorate for Roads of Vietnam (hereinafter referred to as "DRVN").[16] Company No. 238 was under the DRVN until November 2005, when it was reorganized as a Joint Stock Company as part of the Vietnamese government's state-owned enterprise reform (equitization of state-owned enterprises into joint-stock companies with a view to future privatization), and has been in charge of operation and maintenance work since the completion of the project. Bac Nam Joint Stock Company was established as a spin-off from Joint Stock Company No. 238. When the project was completed, operation and maintenance work was

[12] At the time of the appraisal, the exchange rate was estimated at 1 VND = 0.003742 yen, but in reality, the yen had weakened to 1 VND = 0.005547 yen (the period average based on IMF rates from 2005 to 2014).

[13] Since the bid price exceeded the planned price, package was divided into 3 parts and re-bidding was conducted.

[14] By the fourth quarter of 2014, all the construction was basically completed.

[15] Joint Stock Company No. 238 is responsible for the operation and maintenance of KM0 - KM26 section and Bac Nam Joint Stock Company is responsible for KM26 - KM61 section.

[16] Both companies have been selected through competitive bidding. The contract period at the time of the ex-post evaluation is three years, from April 1, 2021 to March 31, 2024.

outsourced through direct contract, but later competitive bidding selection process was introduced. It is also planned that operation and maintenance companies will be selected through competitive bidding after April 2024.

40 out of 50 employees of Joint Stock Company No. 238 and 100 out of 250 employees of Bac Nam Joint Stock Company are engaged in operation and maintenance work of the project. According to the DRVN, Joint Stock Company No. 238 and Bac Nam Joint Stock Company, there is no particular problem with the current staffing as the daily maintenance work has been carried out smoothly and adequately so far. In addition, there is constant communication and close collaboration between each organization. The decision-making process and the authority of each organization are clearly defined in the regulations of the Ministry of Transport of Vietnam (Decision 2296) and the contract, and the operation and maintenance work is carried out based on these regulations.

From the above, no particular problem has been identified regarding the institutional/organizational aspect of operation and maintenance of the project.

<Technical Aspect>

The staff of Joint Stock Company No. 238 and Bac Nam Joint Stock Company, who are in charge of operation and maintenance at the site, have been trained in road maintenance at vocational schools, etc., and have accumulated sufficient skills, knowledge and experience in regular inspection and maintenance of roads on other roads for many years. In addition, they have received technical guidance[17] on the operation and maintenance of automobile expressway from the Japanese consultants in charge of construction supervision of the project, and have acquired the necessary skills, which are utilized in their daily work. Furthermore, as part of the technical cooperation project "The Project for Capacity Enhancement in Road Maintenance" (Phase 1: 2011-2014, Phase 2: 2015-2018), they have received support for capacity enhancement in preparing technical standards for road maintenance, standards for supervisory operations related to maintenance, and budget planning.[18] The acquired knowledge and skills are also utilized in the operation and maintenance of the project, and the training contents are shared and utilized by other staff, generating synergetic effects with the project. There is also an annual training plan, and the staff in charge of operation and maintenance in the field receive training[19] to improve their skills and utilize the latest software related to road maintenance. Senior staff also provide on-the-job training for other operation and maintenance staff. In addition, manuals for daily maintenance have been prepared, and staff in charge of operation and maintenance of Joint Stock Company No. 238 and Bac Nam Joint Stock Company use these manuals on a daily basis to carry out their activities. The manuals are updated as new laws and regulations pertaining to the operation and maintenance of roads (e.g., new regulations related to traffic signs, etc.) are enacted and implemented.

From the above, no particular problem has been identified regarding the technical aspect of operation and maintenance.

<Financial Aspect>

The operation and maintenance cost of the project is financed by the Road Maintenance Fund (hereinafter referred to as "RMF"[20]) of the Vietnamese government. Costs of large-scale repairs will also be covered by the RMF. The budget, actual allocation and actual expenditure for operation and maintenance costs of the project are shown in Table 8. The ratio of the allocated amount to the planned amount has been increasing year by year and is 97% in 2021.

Table 8: Operation and maintenance costs of the project

(Unit: million VND)

	2019	2020	2021
Budget (planned amount)	76,371	64,972	85,888
Actual allocation	59,364	58,384	83,508
Actual expenditure	59,364	58,374	-.

Source: Results from questionnaire survey of DRVN

From the above, no particular problem has been identified regarding the financial aspect of operation and maintenance.

<Current Status of Operation and Maintenance>

According to the interviews with Joint Stock Company No. 238, Bac Nam Joint Stock Company, and the actual project site visits by the local consultant, the high-standard road, interchanges, intersections, traffic signs, and other facilities developed by the project are in good condition and there are no particular problems in their maintenance situation. In addition, interviews with road users and residents[21] in the vicinity did not point out any problems with the road, such as deterioration or defects.

According to Joint Stock Company No. 238 and Bac Nam Joint Stock Company, maintenance activities[22] are carried out properly and there are no particular problems. In addition, the staff in charge of operation and maintenance at the site keeps maintenance records (activity

[17] Specifically, they are trained in traffic operations (patrolling, emergency rescue, emergency traffic control, road obstacle handling, liaison with traffic control room, etc.), road inspection (inspection of road surfaces, road slopes, waterways, bridges, underpasses, traffic signs, guardrails, etc.), road maintenance (cleaning of roads and waterways, patrol management, emergency repair work, disaster prevention, and traffic control during maintenance work, etc.).

[18] According to the DRVN, trainings were conducted in Vietnamese and there were no language problems.

[19] Ten staff members of Joint Stock Company No. 238 and 30 staff members of Bac Nam Joint Stock Company in charge of operation and maintenance take the training every year.

[20] The RMF was established in 2012 to ensure stable budget for the maintenance of national and provincial roads, etc. According to the DRVN, before the establishment of the RMF, only about 40% of the budget request was allocated, but after its establishment, the situation has greatly improved. The RMF's main source of funding is vehicle registration fees.

[21] The interviewees are the same as the interviewees listed in footnote 7.

[22] Specifically, following activities are carried out.

- Daily maintenance (daily, weekly): cleaning of road surfaces, bridges and drainage facilities, mowing along the road, etc.
- Routine maintenance (monthly, quarterly): installation of curbs, repair and painting of traffic signs, etc., inspection of public transformer facilities, etc.
- Preventive maintenance (monthly, quarterly): repainting of lane markings, replacement of reflective road studs, replacement of bridge drainage pipes, etc.
- Troubleshooting maintenance (monthly, quarterly): repair of damaged or deformed pavement, replacement of traffic signs, replacement of fences, replacement of cross-drainage facilities in road embankments, etc.

items, contents, quantity, etc.) for each activity, and Joint Stock Company No. 238 and Bac Nam Joint Stock Company make plans for future maintenance and repair based on the records.

Main spare parts are traffic signs, reflective road studs, fences, etc., which are stored in the warehouses of Joint Stock Company No. 238 and Bac Nam Joint Stock Company. The warehouses are located on dry and elevated ground to avoid flood damage. All spare parts can be procured in Vietnam and are always available in the warehouses, and they are being systematically managed to ensure timely replacement when needed.

From the above, no particular problem has been identified regarding the operation and maintenance status.

<Evaluation Result>

Therefore, the sustainability of the project effect is high.

III. Recommendations & Lessons Learned

Recommendations to Executing Agency:

It is important for the executing agency to provide JICA with information on the maintenance equipment for high-standard road and the introduction and installation of toll plaza and ITS facilities, which were excluded from the scope of the project, in the event that the Vietnamese side again raises the issue of a development plan using the BOT scheme.

Recommendations to JICA: None

Lessons Learned for Executing Agency and JICA:

The reason why part of the scope was excluded from the project and the Vietnamese side decided to consider the development by the BOT scheme was that it was to cope with the shortage of ODA loan funds due to the soaring prices of construction materials and equipment. On the other hand, introduction of toll plaza and ITS facilities are closely related not only to this project but also to the policies and systems of the Vietnamese government concerning the entire road transportation network. For this reason, it is important that JICA continues to hold close policy dialogues with the Vietnamese side through the executing agency and to keep abreast of the Vietnamese government's policies, future plans, and the status of its institutional and organizational development regarding Vietnam's transportation (road) sector development utilizing funds and know-how of private sector, such as BOT scheme. Thus, when JICA considers similar projects such as the national road development projects in the future, it is important for JICA to make decisions on whether or not to provide assistance based on the specific situation at that time and future prospects. If support will be provided, then it is important that the project scope, etc., to be set while closely coordinating with the Vietnamese side at the project planning stage.

As regards each indicator of quantitative effects of the project, the executing agency did not measure the actual figures under the same conditions as those set at the time of the ex-ante evaluation after 2016, which is the year of comparison. Therefore, the actual data for 2019 and 2020 obtained from the executing agency at the time of the ex-post evaluation were only regarded as references, and making analysis on the quantitative effects of the project over time in a consistent manner was not possible, making it difficult to accurately grasp the project effects. Thus, it is important for the executing agency to continue measuring actual data over time after project completion under the same conditions as those set during the ex-ante evaluation as part of the project supervision. JICA is also expected to encourage the executing agency for the enhancement of accuracy of quantitative analysis of the ex-post evaluation by following up with them as necessary to ensure that they measure each indicator of quantitative effects appropriately.

National Highway No. 3 constructed by the project

Place where residents are resettled

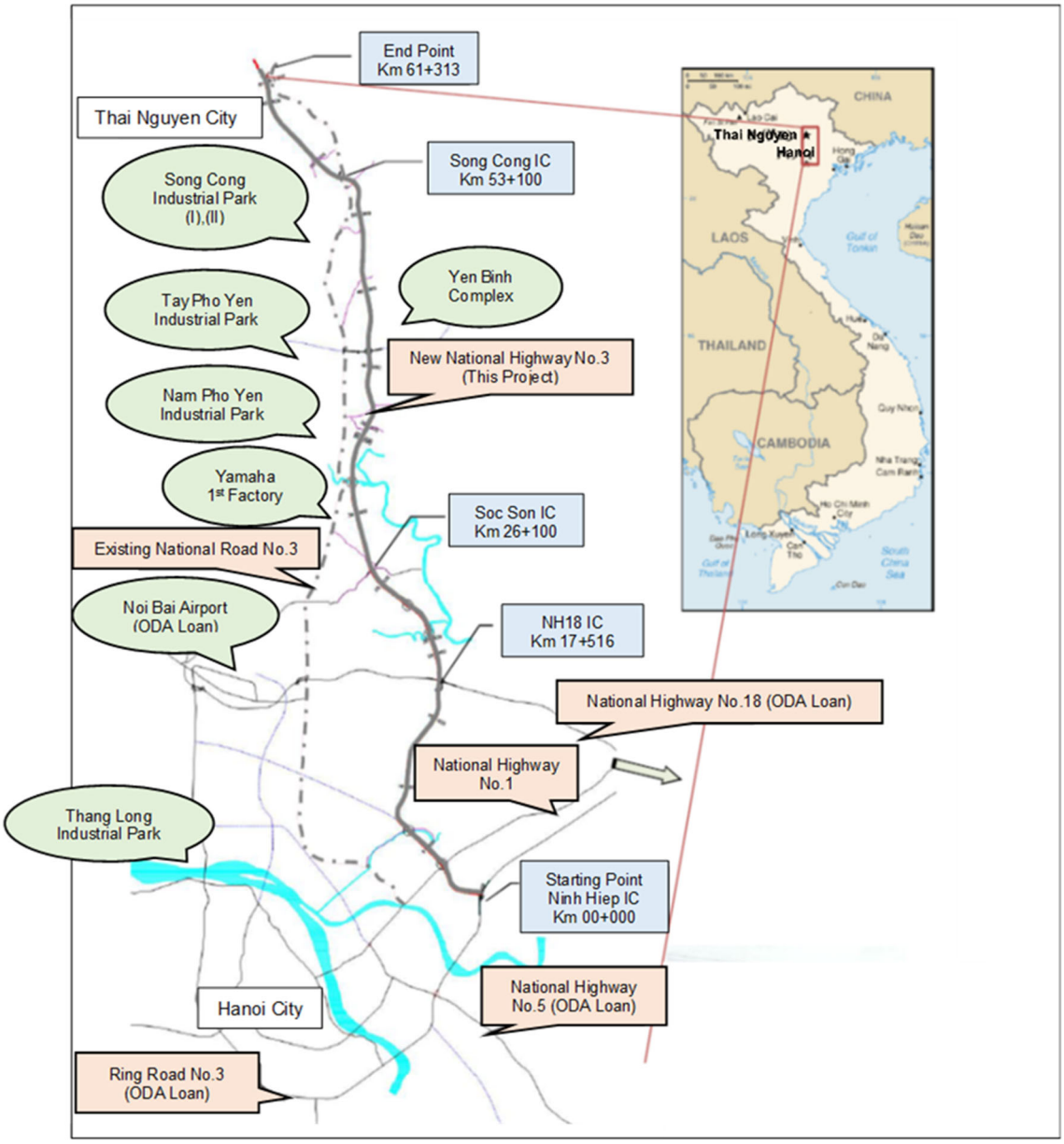


Figure 1: Location map of the project

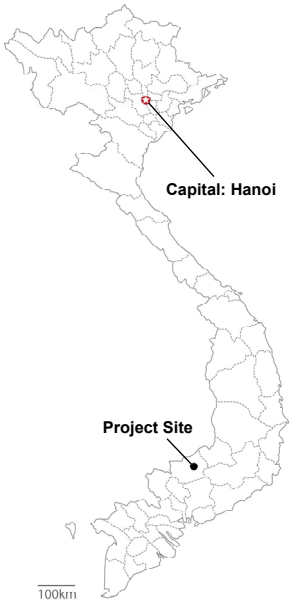
Source: prepared by the evaluator, based on the document provided by JICA

FY2020 Simplified Ex-Post Evaluation Report of Japanese ODA Loan Project

External Evaluator: Masumi Shimamura, Mitsubishi UFJ Research and Consulting Co., Ltd.

Duration of the Study: November 2020－January 2022
Duration of the Field Study: Not implemented

Country Name	(ODA Loan) Thac Mo Hydropower Station Extension Project
Socialist Republic of Viet Nam	



Location of the Project site

Exterior of the Thac Mo Hydropower Station

I. Project Outline

Background	Vietnam's demand for electrical power had soared due to its economic growth. From 1996 to 2002, national power consumption grew on average at 14.6% annually. Vietnam Electricity predicted that the power demand would grow at an average rate of 13.8% each year until 2010 in southern region. In particular, the demand for power in parts of the northeastern region of southern Vietnam and the Central Highlands, which were the sites of the project, was expected to grow by 16.0% each year. Specifically, power supply and demand in the region was expected to be tight in 2009 (shortage of 534 MW), even after taking into account the construction of new power stations other than the project (126 MW). Therefore, easing the gap between the demand and supply of power in the region was an urgent concern.			
Objectives of the Project	The objective of the project was to improve the power supply situation by extending a 75 MW hydropower station in the existing Thac Mo hydropower station in southeastern Vietnam where power supply and demand situation was tight, thereby contributing to the revitalization of economic activities and the improvement of living environment of residents.			
Contents of the Project	1. Project Site: Thac Mo Town, Binh Phuoc Province, Vietnam 2. Japanese side: 1) Civil works, procurement of equipment, etc. ・ Civil works: Inlet channel, intake facilities, surge tank, etc. ・ Water steel structure: Penstock, other water gate equipment ・ Power generation equipment: Turbine (francis × 1 unit), generator (75 MW × 1 unit), main transformer, etc. 2) Consulting services ・ Detailed design, bid document review ・ Assistance in tendering and contract ・ Construction supervision 3. Vietnamese side: ・ Land acquisition, etc.			
Implementation Schedule	E/N Date	March 31, 2004	Disbursement Date	January 31, 2019
	L/A Date	March 31, 2004	Completion Date	November 2018 (At the end of the warranty period)
Project Cost	Total Project Cost (Planned): 7,026 million yen Loan Approved Amounts: 5,972 million yen Disbursed Amounts: 4,533 million yen			
Executing Agency	Vietnam Electricity: EVN			
Conditions (Loan only)	Interest Rate: 0.75%, Repayment Period:40 year (of which, Grace Period: 10 years), General Untied			
Borrower (Loan only)	The Government of the Socialist Republic of Viet Nam			
Contracted Agencies	Main Contractors: National Research Institute of Mechanical Engineering Narime (Vietnam) / Lilama 45.4 Joint Stock Company (Lilama 45.4) (Vietnam) (JV), Alstom Hydro (France) / GE Power India Limited (India), Truong Son Construction Corporation (Vietnam) / Underground Works Construction Joint Stock Company			

	(Vinavico) (Vietnam) (JV) Main Consultants: Electric Power Development Co., Ltd. (Japan) / Nippon Koei Co., Ltd. (Japan) Agent: N.A.

II. Result of the Evaluation

Summary

This project extended a 75 MW hydropower station in the existing Thac Mo hydropower station with the aim of improving the power supply situation in southeastern Vietnam where power supply and demand situation was tight. The project, which aimed to alleviate the power supply and demand gap in the region, was consistent with Vietnam's development policy, development needs and Japan's assistance policy which put up economic infrastructure development as a priority area of assistance. Therefore, the relevance of the project is high. In terms of project implementation, although the project cost was within the plan, the project period exceeded the plan. Therefore, efficiency of the project is fair. As for project effects, indicators for forced outage hours and maximum output have achieved the targets. Net electric energy production was slightly less than 80% of the target, because the actual rainfall was less than expected. In order to secure water supply to the lower reaches of the Be River[1] during the dry season and to ensure the safety of the power system from a regional perspective, the National Load Dispatch Center adjusted the grid and supply/demand operations and restricted the operation of the power station. As a result, the target was not reached. The power station has responded to the peak power demand in response to fluctuating demand, contributing to a stable power supply. It can be considered that the project has been also contributing to the revitalization of economic activities in the southeastern region of Vietnam and to the improvement of the living environment of local residents. Therefore, the project has mostly achieved its objectives and thus, effectiveness and impacts of the project are high. No negative impacts on natural environment have been reported, and resettlement and land acquisition process has carried out appropriately in accordance with the relevant regulations of Vietnam, thus, no problem has been seen. No major problem has been observed in the institutional/organizational, technical and financial aspects of operation and maintenance as well as in the current status. In addition, the power station is operating smoothly and in good condition. Therefore, sustainability of the project effects is high.

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

Overall Rating[2]	**A**	**Relevance**	**③[3]**	**Effectiveness & Impact**	**③**	**Efficiency**	**②**	**Sustainability**	**③**

<Special Perspectives Considered in the Ex-Post Evaluation／Constraints of the Ex-post Evaluation>

In this study, due to the global spread of COVID-19, the external evaluator could not travel to Vietnam, and affected by domestic infection control measures in Vietnam, the local consultant could not conduct actual inspection, etc., of the project, either. Therefore, the survey was conducted completely remotely, including the local consultant. For this reason, the external evaluator could not directly visit the site to check the outputs or conduct interviews with stakeholders, etc., and thus conducted evaluation analysis and judgment by closely examining the information and data obtained through remote surveys utilizing the local consultant.

1 Relevance

<Consistency with the Development Policy of Vietnam at the Time of Ex-Ante Evaluation>

Regarding the power development plan of the Vietnamese government at the time of the appraisal, the *Fifth Master Plan for Vietnam Power Sector (2001-2010)* called for the construction of new power stations with a total installed capacity of 18,110 MW by 2010, balancing thermal power for base load and hydropower for middle/peak load. In addition, based on the "Power Sector Policy Statement" established by the Ministry of Industry, the power sector reform was being carried out in line with the policy of gradually opening the power market after securing stable power supply capacity. The project aimed to ensure stable power supply by extending a hydropower station to support peak loads, which was consistent with the development policy at the time of the appraisal.

<Consistency with the Development Needs of Vietnam at the Time of Ex-Ante Evaluation>

At the time of the appraisal, power supply and demand situation was expected to be tight as described in the Background, and thus the necessity to implement the project was high.

<Consistency with Japan's ODA Policy at the Time of Ex-Ante Evaluation>

At the time of the appraisal, in the Japanese government's *Country Assistance Program for Vietnam* (April 2004) and the *Overseas Economic Cooperation Operations* and the *Country Assistance Strategy* of JICA (then JBIC), the development of economic infrastructure including power was regarded as the priority area for assistance in order to achieve sustainable economic growth.

<Evaluation Result>

In light of the above, the relevance of the project is high.

2 Effectiveness/Impact

<Effectiveness>

(Quantitative Effects)

At the time of the ex-ante evaluation, "forced outage hours (hour/year)," "net electric energy production (GWh/year)," and "maximum output (MW)" were set as quantitative effects of the project. Table 1 summarizes baseline, target, and actual figures for each indicator. As

[1] The Be River flows through Thac Mo Town, Binh Phuoc Province, where the project is located, and the hydropower station is operated using the Be River water.
[2] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory
[3] ③: High, ②: Fair, ①: Low

the project completion was in November 2018 (at the end of the warranty period), the target year to be compared is 2020, 2 years after completion.

- Forced outage hours: The actual figure in 2020 was 5.40 hours, which was lower than the target (12.39 hours) and achieved the target. The achievement rate is 229%.[4]
- Net electric energy production: The actual figure in 2020 was 39.2 GWh and the achievement rate of the target (52 GWh) is 75%. According to Thac Mo Joint Stock Company (hereinafter referred to as "Thac Mo JSC"), which is in charge of operation and maintenance of the project, the target achievement rate was slightly below 80% because of low rainfall in 2020. According to Thac Mo JSC, 46 GWh of net electric energy production was initially planned in accordance with the power generation plan for 2020 as shown in the document (No.3733/QD-BCT) of the Ministry of Industry and Trade of Vietnam. However, since the actual rainfall was lower than expected, the National Load Dispatch Center[5] restricted the operation of the power station to ensure water supply to the lower reaches of the Be River during the following dry season and the safety of the power system.[6] It was explained that Thac Mo JSC adjusted the daily power generation according to the instructions and as a result, net electric energy production in 2020 did not reach the target. According to the executing agency, the reason why the actual figure for 2019 was below 52 GWh was also due to low rainfall. Rainfall is an essential factor in achieving the project objectives. Since data or information to support the low rainfall have not been obtained from the executing agency, as a next best measure, rainfall data for the area around Thac Mo hydropower station was obtained from the "World Rainfall Distribution Statistics" website[7] of the Japan Aerospace Exploration Agency (JAXA) and is summarized in Figure 1. From this data, it appears that rainfall in 2019 has decreased from the previous year, but it cannot be said that the rainfall in 2020 has clearly decreased.
- Maximum output: The actual figure for 2020 was 75 MW, achieving the target (75 MW). The achievement rate is 100%.

Table 1: Quantitative Effects of the Project

Indicators	Target (2010) 2 Years after Start of Operation	Actual		
		2018	2019	2020
Forced Outage Hours (hour/year)	12.39	36.46 Note	10.57	5.40
Net Electric Energy Production (GWh/year)	52	133.7	47.8	39.2
Maximum Output (MW)	75	75	75	75

Source: Ex-ante evaluation report, project completion report and results from questionnaire survey of the executing agency

Note: The forced outage hours in 2018 were caused by the initial troubles with the turbine water seal systems and the filter of the water cooling system.

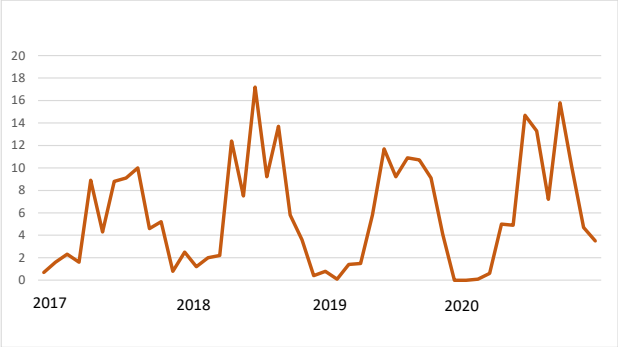


Figure 1: Average Monthly Rainfall near Thac Mo Hydropower Station (unit: mm)

Source: Prepared based on the data obtained from JAXA's "Global Rainfall Distribution Statistics" website.

(Qualitative Effects)

"Improvement of power generation capacity" and "stable power supply" were set as qualitative effects of the project. Thac Mo hydropower station is a peak-road power station, and the generated power is transmitted to the grid, covering the southeastern part of Vietnam including Ho Chi Minh City and a wide area. Among them, the main supply area is Binh Phuoc Province, where the hydropower station is located, thus Table 2 summarizes the maximum power demand and actual power consumption in the province. Both of these trends have been steadily increasing. According to the executing agency, the additional power supplied by the extended power station is contributing to stabilize the grid, but the maximum output of this power station is 75 MW, which is not a large amount of power generation from the perspective of the entire power system. In addition to this power station, Binh Phuoc Province has several other hydropower stations,[8] and also receives electricity from power stations in other regions via the grid. Therefore, it can be said that the stable power supply is largely due to the results of continuous improvement of power generation capacity by the executing agency including this project.

[4] The target achievement rate was calculated by defining it as the target figure / actual figure.
[5] In general, the power generated at power stations is sent to the grid (power transmission system network) in each region, and then the National Load Dispatch Center or the Regional Load Dispatch Center adjusts the system / supply and demand operations from a wide-area perspective, and then the power is transmitted to each region via the grid again.
[6] An official letter (Ref. 4136/DĐQG-TTD) has been issued by the National Load Dispatch Center instructing to restrict the operation of the power station.
[7] https://sharaku.eorc.jaxa.jp/GSMaP/index_j.htm
[8] There are several hydropower stations including Can Don hydropower station (77.5 MW) and Srok Phumieng hydropower station (51 MW).

Table 2: Trend of Maximum Power Demand and Power Consumption in Binh Phuoc Province

	2015	2016	2017	2018	2019	2020
Maximum Power Demand (MW) Note 1	1,562	1,615	1,670	1,726	1,784	1,845
Actual Power Consumption (MWh) Note 2	1,144	1,568	1,646	1,693	2,204	2,500

Source: Results from questionnaire survey of the executing agency

Note 1: Maximum power demand (MW) is the instantaneous maximum demand during peak hours.

Note 2: Actual power consumption (MWh) is the actual consumption converted to hourly average.

<Impacts>

(1) Intended Impacts

"Revitalization of economic activities" and "improvement of living environment of local residents" were regarded as expected impacts of the project.

- Revitalization of economic activities: It is difficult to verify direct correlation with the project since factors other than the project are also affecting. However, in order to confirm the assumptions made at the time of the ex-ante evaluation, the trends of industrial production and Gross Regional Domestic Product (hereinafter referred to as "GRDP") in Binh Phuoc Province and Ho Chi Minh City are shown in the table below from a comparative perspective. The table below shows the trend of industrial output and gross regional domestic product (GRDP) in Ho Chi Minh City in comparison with Binh Phuoc Province. Industrial production in 2017, when the expanded hydropower station began operating, grew at a much faster rate than the previous year and has outpaced the rate of increase in Ho Chi Minh City since 2017. The GRDP growth rate of Binh Phuoc Provinces in 2017 was also much higher than the previous year and has been steadily increasing since then. In addition, the growth rate in 2019 is much higher than in Ho Chi Minh City.

Table 3: Trend of Industrial Production

(Unit: indexed using 2010 figures as 100)

	2015	2016	2017	2018	2019 Note
Binh Phuoc Province	106.8	106.0	116.2	119.9	119.5
Ho Chi Minh City	107.2	107.3	115.7	115.8	115.0

Source: General Statistics Office of Vietnam

Note: Preliminary figures

Table 4: Trend of GRDP Growth Rates

(Unit: % (2010 Standard))

	2015	2016	2017	2018	2019
Binh Phuoc Province	6.37	5.03	6.58	8.27	9.11
Ho Chi Minh City	9.85	8.05	7.76	8.30	8.32

Source: Statistics Offices in Binh Phuoc Province and Ho Chi Minh City

In addition, Binh Phuoc Province has 13 large-scale industrial parks (total area of 4,686 ha) and is making efforts to attract foreign investment. In December 2020, CPV Food, a Vietnamese subsidiary of Thailand's major conglomerate Charoen Pokphand Group (CP), began operating the largest poultry processing plant in Southeast Asia (total investment of USD250 million and site area of over 10 hectares).[9] Stable power supply is a prerequisite for enabling investment environment, and it can be said that the project has contributed to the revitalization of economic activities to a certain extent.

- Improvement of living environment of local residents: According to the executing agency, "household electrification rate" was already 100% before the project. Existing studies have shown that nightlight intensity is strongly correlated with economic indicators, thus the analysis of nightlight intensity in Binh Phuoc Province from 2014 to 2020 was made as an alternative indicator for electrification rate, etc. Specifically, Google Earth Engine was used to extract the nightlight data from VIIRS Nighttime Day/Night Band Composites Version 1 using the administrative boundary data from Humanitarian Data Exchange v1.56.0 and the average annual nightlight intensity was calculated. (Figure 2) In 2017, when the power station expanded by the project started operation, the nightlight intensity increased significantly compared to the previous year, and it has steadily increased since 2017.

[9] Source: From JETRO information.
https://www.jetro.go.jp/biznews/2021/01/18df94ad59fcf767.html
https://binhphuoc.gov.vn/vi/binh-phuoc-portal/plan-projects/security-potilics-economy-and-society-45.html

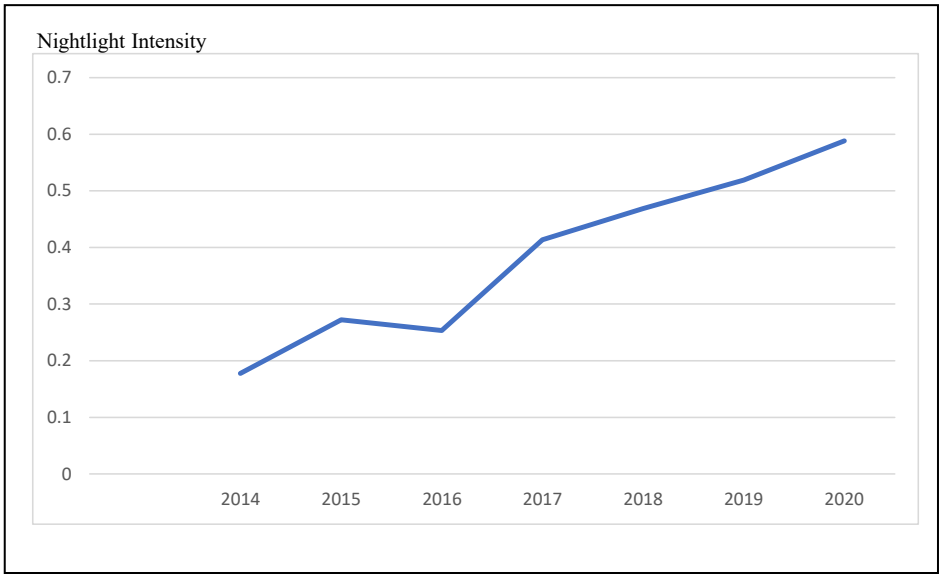
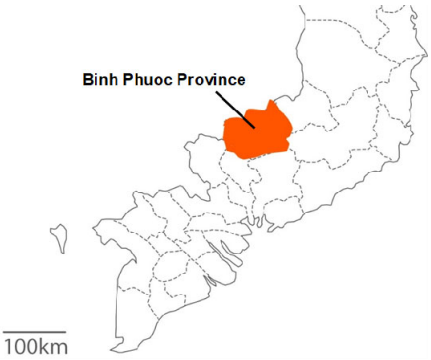
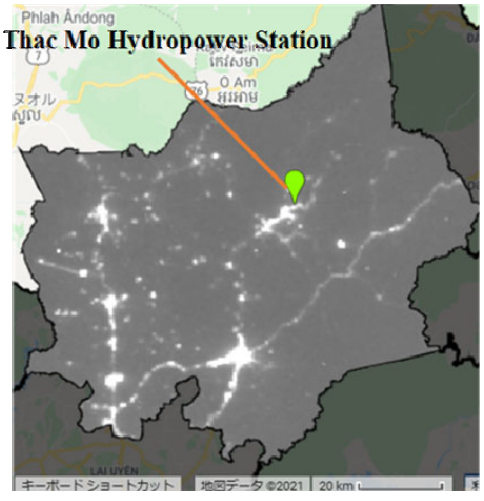


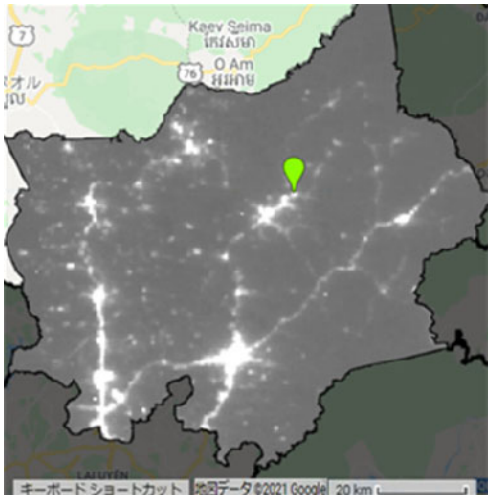
Figure 2: Trend of Nightlight Intensity (average) in Binh Phuoc Province
Source: Prepared based on VIIRS Nighttime Day/Night Band Composites Version 1, Humanitarian Data Exchange v1.56.0

The nightlight image in Binh Phuoc Province is also shown in Figure 3. Comparing the image in 2014, when construction of civil works of the project began, with that of 2020, the year of the ex-post evaluation, it can be seen that the nightlight intensity has become slightly stronger overall. Although the project is not the only one that has contributed to the rise in nightlight intensity in Binh Phuoc Province, the additional power supply from the expansion of the hydropower station is thought to have contributed to a certain extent. Therefore, it can be considered that the project is contributing to the revitalization of economic activities and the improvement of living environment of local residents.





2014 (Before the project (the year of the start of the civil works))



2020 (After operation of power station)

Figure 3: Image of Nightlight in Binh Phuoc Province
Note: There are other hydropower stations in Binh Phuoc Province in addition to this power station and power is also supplied from power stations in other regions via the grid.

(2) Other Positive and Negative Impacts

① Impacts on the Natural Environment

This project is classified as category B in the *JBIC Guidelines for Confirmation of Environmental and Social Considerations* (April 2002). The project did not require the approval of the Vietnamese government for the Environmental Impact Assessment (EIA) Report and therefore EIA was not prepared. According to the executing agency, environmental monitoring was conducted quarterly during the project for items of air, water quality, noise, vibration, and fish biodiversity. According to the environmental monitoring report of the executing agency, water quality and noise have temporarily exceeded the standards, but according to interviews with the executing agency and a Japanese consultant in charge of construction supervision, it did not develop into a big problem as a result of taking measures such as installing sedimentation basin for cement polluted water and reducing the amount of chemicals for blasting in places near a private houses. In addition, according to the monitoring report, residents pointed out that domestic water had high hardness, and when the executing agency investigated it, it was found that $CaCO_3$ (calcium carbonate) exceeded the standard. However, as a result of verification by the executing agency, it was confirmed that the project was not the direct cause, as the water source was in an area with high water hardness.

② Impacts on the Social Environment (Land Acquisition and Resettlement)

Involuntary resettlement occurred to 53 households (179 people) as a result of the project.[10] According to the executing agency, land acquisition and resettlement was carried out by the People's Committee of Phuoc Long Town in accordance with the Vietnamese national procedures and the resettlement action plan. A Compensation Committee was established by the People's Committee and procedures for land acquisition and resettlement have taken place. According to the executing agency, the members of the Compensation Committee consisted of the Department of Natural Resources and Environment, the Department of Economy and Infrastructure, the Duc Hanh Commune People's Committee, the Head of Thac Mo JSC and experts, and did not include representatives of the resettled residents.[11] However, opinions and requests of the resettled residents were heard by the Compensation Committee, and reasonable opinions were accepted.

The Compensation Committee met as needed, including when determining the calculated value of real estate and compensation for resettled households. After surveying the land area and confirming the owner, compensation was paid based on the unit price of compensation according to the land area and in accordance with the Vietnamese national law. Consultations with residents and negotiations on the amount of compensation have been carried out on a cumulative basis, and consensus was reached through these discussions. There were no complaints from the resettled residents and all 53 households agreed to resettle and accepted the amount of compensation, which was subsequently paid as agreed. In addition, there were no complaints or opposition movements from resettled residents or NGOs during the entire process of land acquisition and resettlement. According to the executing agency, the standard of living of the residents has at least recovered compared to the situation before the resettlement.

③ Other Impacts: Reducing Flood Damage by Utilizing the Water for Power Generation

As a positive impact, it would be possible to reduce flood damage in the lower reaches of the Be River by reducing the water flow in the spillway during the rainy season by operating the power station and using the amount of water for power generation.

<Evaluation Result of Effectiveness and Impacts>

As quantitative effects of the project, three indicators of "forced outage hours," "net electric energy production" and "maximum output" were set at the time of the ex-ante evaluation, and at the time of the ex-post evaluation, forced outage hours and maximum output have reached the targets. The actual figure of net electric energy production was slightly less than 80% of the target. This was because the amount of rainfall in 2020 was lower than expected and the National Load Dispatch Center restricted the operation of the power station to ensure water supply to the lower reaches of the Be River during the dry season of the following year and the safety of the power system. Although it is largely due to the results of continuous improvement of power generation capacity by the executing agency including the project, it is judged that the failure to achieve the target of net electric energy production would not be a factor to reduce the overall effectiveness since the additional power supply from the extended power station by the project contributes to the stabilization of the grid to a certain extent, the other two indicators have achieved the targets, and net electric energy production has achieved 75% of the target. Based on the results of large-scale investments in Binh Phuoc Province, which is a major power supply area, and the trend of nightlight intensity in the province, it is considered that the project has been contributing to the revitalization of economic activities and the improvement of the living environment of local residents. Therefore, the project has mostly achieved its objectives and the effectiveness/impact of the project is high.

3 Efficiency

<Outputs>

The contents of the project indicated in "I. Project Outline" were generally implemented as planned. The upstream section of the penstock was changed from an inclined shaft to a vertical shaft based on the actual geological conditions at the site, and this change has not affected the safety or project effectiveness. Thus it can be considered as a relevant change.

<Inputs>

The total project cost was initially planned to be 7,026 million yen (out of which 5,972 million yen was to be covered by Japanese ODA loan). In actuality, the total project cost was 5,710 million yen[12] (out of which 4,533 million yen was covered by Japanese ODA loan), which was lower than planned (81% of the planned amount). As described below, the project cost was significantly reduced because the selection method of contractors was changed from international competitive bidding in the original plan to local competitive bidding.

Project period (from signing of loan agreement to the end of the warranty period) was planned to be from March 2004 to December 2009 (70 months), but in actuality, it was from March 2004 to November 2018 (177 months) and significantly exceeded the plan (253% of the initial plan). As a result, loan period was extended twice, in July 2011 and November 2015. Table 5 summarizes the comparison of planned and actual project period for each item.

[10] At the time of the ex-ante evaluation, involuntary resettlement of 12 households (30 people) was anticipated. The increase in the number of resettlement was due to significant delay in the project, during which time natural and social growth of the population occurred.

[11] The reason for this was that the selection of resettled resident representatives was not mandatory by the Vietnamese national law.

[12] The exchange rate was calculated using 1VND = 0.005518 yen and 1USD = 103.52 yen. (From IMF International Financial Statistics (2004-2018 average rates))

Table 5: Comparison of Planned and Actual Project Period for Each Item

Item	Plan	Actual
Selection of consultants	January 2004–June 2004 (6 months)	September 2005 (start of bidding)–April 2006 (8 months)
Detail design, tender assistance (selection of contractors)	July 2004–November 2005 (17 months)	May 2006–June 2014 (98 months) *Of which, consulting services were suspended in June 2008 and resumed in January 2011. (Resumption was announced in July 2010.)
Civil works	December 2005–December 2008 (37 months)	July 2014–July 2017 (37 months)
Start of operation	December 2008	July 2017
End of the warranty period	December 2009	November 2018

Source: Information provided by JICA, results from questionnaire survey of the executing agency, and interview with the Japanese consultant in charge of construction supervision

The main reasons why the project period significantly exceeded the plan were due to (1) the delay in starting the consultant selection process and (2) the significant delay in the contractor selection process.

As regards (1), there is a gap of about one and a half years between the signing of loan agreement (March 2004) and the start of selection of consultants (September 2005). The reason for this was that the pre-construction work such as land acquisition and removal of power lines was delayed more than expected, and the schedule was changed to avoid the start of construction during the rainy season, which pushed back the overall process of the project. As such, the executing agency changed the consultant selection method because it no longer needed to conclude contract with consultant early after the start of the project that it was aiming for. Initially, the executing agency planned to conclude direct contract with the consultant who conducted the special assistance for project implementation of the project and start the project efficiently. However, due to the above reasons, even if the consulting work was started immediately, it turned out that the civil work could not start until after the rainy season. Therefore, the executing agency could no longer see the merit of starting the consulting services immediately after the start of the project under direct contract, and changed the selection method to competitive bidding.

As regards (2), consulting services were temporarily suspended from June 2008 and resumed in January 2011, a suspension of about 31 months. The reason for this was that the contractors' bid, initially held in 2007, was unsuccessful because the bid amount greatly exceeded the executing agency's planned amount, and it took time for the executing agency to reconsider the bidding method. The reason behind this was the significant rise of prices of construction materials, equipment, and labor costs. The executing agency finally divided the bidding lot for civil works into two, and changed the selection method from the originally planned international competitive bidding to local competitive bidding for both lots.

< Internal Rates of Return (Reference only)>

The Financial Internal Rate of Return (hereinafter referred to as "FIRR") at the time of the appraisal was 6.6%, calculated on the assumption that electricity sales[13] to be considered as benefit, construction cost, operation and maintenance cost, management cost and tax to be regarded as cost, and project life assumed to be 50 years. The FIRR recalculated at the time of the ex-post evaluation turned out to be 4.2%, which is lower than the figure at the time of the appraisal.

The Economic Internal Rate of Return (hereinafter referred to as "EIRR") at the time of the appraisal was 15.3%, calculated on the assumption that alternative thermal value to be considered as benefit, construction cost, operation and maintenance cost and management cost to be regarded as cost, and project life assumed to be 50 years. The EIRR recalculated at the time of the ex-post evaluation turned out to be 10.5% which is lower than the figure at the time of the appraisal.

The main reason why both FIRR and EIRR were lower than the figures at the time of the appraisal is considered to be because the actual amount of power generation was below the expectations at the time of the appraisal.

In light of the above, although the project cost was within the plan, the project period exceeded the plan. Therefore, the efficiency of the project is fair.

4 Sustainability

<Institutional/Organizational Aspect>

The operation and maintenance of the facilities and equipment of the power station extended by the project is carried out by Thac Mo JSC based on the operation service contract concluded between the EVN,[14] the executing agency, and Thac Mo JSC, a company in charge of operation and maintenance. The operation service contract is renewed annually, and Thac Mo JSC submits its work plan and budget estimations to the EVN at the beginning of each year, and carries out operation and maintenance work upon the EVN's approval. In addition, Thac Mo JSC reports its work performance to the EVN every month and is required to report to the EVN whenever a problem occurs.

The breakdown of the staff in charge of operation and maintenance of Thac Mo hydropower station is shown in Table 6 (total of 48 staff excluding outsourced security guards and cleaners).

[13] The figures for electricity sales are for convenience only, and the EVN does not calculate the official electricity sales revenue from the extended hydropower stations by the project. The reason for this is that all the electricity produced by the EVN-owned power stations is combined into the EVN's power network, so the revenue from the sale of electricity from individual power stations is not calculated.

[14] At the time of the ex-post evaluation, the EVN has the ownership of Thac Mo hydropower stations, including the existing power station.

Table 6: Breakdown of Staff in Charge of Operation and Maintenance of Thac Mo Hydropower Station

	Role/Position	Number of Staff	Note
1	Operation Chief (Central Control Room)	5	Concurrent work with existing power station work
2	Operation Leader (this power station)	5	Concurrent work with existing power station work
3	Operator (central control room)	5	Concurrent work with existing power station work
4	Operator (machine room)	5	Full-time work at the extended additional power station
5	Planning and power market engineer	1	Concurrent work with existing power station work
6	Technical engineer	1	Concurrent work with existing power station work
7	Firefighting equipment engineer	1	Concurrent work with existing power station work
8	Maintenance worker	25	Concurrent work with existing power station work
9	Security	6	Outsource
10	Cleaning staff	1	Outsource
	Total	55	

Source: Results from questionnaire survey of Thac Mo JSC

According to Thac Mo JSC, the current staffing is sufficient and smooth operation and maintenance work has been carried out and thus there are no particular problems. In addition, Thac Mo JSC is in constant communication with the EVN, and a close collaboration system is in place. The decision-making process, authority, etc., are clearly defined in the operation service contract, and the operation and maintenance work is carried out based on the contract.

From the above, no particular problem has been identified regarding the institutional/organizational aspect of operation and maintenance of the project.

<Technical Aspect>

The staff in charge of operation and maintenance of Thac Mo JSC is deployed with personnel who have accumulated sufficient skills, knowledge and experience. For example, almost all of the operators are university graduates with expertise in engineering (electricity and electrical systems) and have accumulated sufficient skills and experience in the operation and maintenance of the power station. The maintenance and inspection workers are also a team of engineers with a wealth of experience and skills, and even if a sudden on-site problem were to occur, repair work can be carried out quickly.

Thac Mo JSC has its own training system and training plan, and all operation and maintenance staff receive training according to the plan. Prior to the start of operation of the power station, Thac Mo JSC conducted training for all staff in charge of operation and maintenance. After the start of operation, experts are invited from the National Load Dispatch Center every year to provide training on power system operation for operation chiefs and operation leaders based on the training agreement between Thac Mo JSC and the National Load Dispatch Center. Thac Mo JSC also conducts monthly training for operators.[15] In both trainings, after attending the training and passing the certification exam, certificates are issued. In addition, senior staff in charge of operation and maintenance provide on-the-job training to other staff.

Seventeen manuals have been prepared for daily operation and maintenance work, and the staff in charge of operation and maintenance use these manuals on a daily basis to carry out their work. The manuals are revised and updated based on the ISO regulations and other standards. In addition to the manuals, operation and maintenance activities are carried out by referring to the manufacturers' instruction manuals and the EVN's major repair regulations.

From the above, no particular problem has been identified regarding the technical aspect of operation and maintenance.

<Financial Aspect>

Tables 7 shows the budget, actual allocation and actual expenditure of operation and maintenance costs of the hydropower station extended by the project. Operation and maintenance costs are allocated and disbursed based on the actual costs, and therefore do not match the budget estimates (planned amounts) that Thac Mo JSC submits to the EVN at the beginning of the year. In 2018, the actual cost of operation and maintenance was less than the planned amount, while in 2019 and 2020, it was more. The required amount has been fully allowed for and is allocated in a timely manner.

[15] The main content of the training includes operation monitoring, operating, and troubleshooting of power generation equipment, understanding single wire connection diagrams and control panels, power system operation, and equipment repair.

Table 7: Operation and Maintenance Costs of the Hydropower Station Expanded by the Project

(Unit: million VND)

	2018	2019	2020
Budget (planned amount)	5,117	5,117	5,117
Actual allocation	4,246	5,412	5,384
Actual expenditure	4,246	5,412	5,384

Source: Results from questionnaire survey of Thac Mo JSC

The EVN's financial data (consolidated financial statements) are shown in Table 8. Both net sales of goods and services, and gross profit from sales and service provision have shown steady transition.

Table 8: EVN's Consolidated Financial Statements

(Unit: billion VND)

	2018	2019	2020
Net sales of goods and services	10,048	44,167	40,367
Cost of goods sold and services provided	-8,810	-39,105	-35,606
Gross profit from sales and service provision	1,238	5,062	4,760
Financial revenue, corporate expense administrative expenses, etc.	-1,978	-3,796	-2,467
Net profit from operating activities	-740	1,266	2,294
Other losses	4	-27	-1
Total accounting profit before tax	-736	1,239	2,292
Current corporate income tax expense	-144	-87	-477
Deferred Income Tax expense	27	-26	-
Profit after corporate income tax	-853	1,125	1,815

Source: EVN Annual Reports (2018, 2019, 2020)

Note: Some figures do not match due to rounding.

Table 9 summarizes the trend of the EVN's major financial indicator data. In terms of solvency, both current and the quick ratio for 2015-2019 are higher than 1 time, and in 2019 they are 1.63 times and 1.38 times respectively, which show the positive sign in the management of cash flows while keeping the liquidity at a safe level. In terms of performance, both the number of days of receivable and the number of days of inventory is lower than the previous year in 2019, indicating an improvement in the indicator. Fixed asset turnover is on the rise, showing that the EVN is making effective use of its assets. In terms of profitability, although gross profit ratio, profit from operating activities on net revenue ratio, and profit before tax on equity ratio were all slightly lower than the previous year in 2019, the overall trend suggests that the EVN continues to maintain high profitability.

Table 9: Trend of EVN's Major Financial Indicator Data

Indicator	Data	2015	2016	2017	2018	2019
Solvency	Current ratio (Times)	1.32	1.77	1.46	1.63	1.63
	Quick ratio (Times)	1.06	1.47	1.21	1.37	1.38
	Cash ratio (Times)	0.1	0.19	0.38	0.22	0.25
Performance	Days of receivable (days)	46.97	59.98	75.47	78.43	74.04
	Days of inventory (days)	30.39	31.41	33.24	31.74	27.49
	Fixed asset turnover (Times)	0.71	0.56	0.64	0.71	0.77
Profitability	Gross profit ratio (%)	9.16	9.85	11.36	12.54	11.36
	Profit from operating activities on net revenue ratio (%) Note	2.78	2.49	4.20	5.39	4.96
	Profit before tax on equity ratio (%) Note	7.76	11.30	17.78	21.49	17.92

Source: EVN Annual Report (2019)

Note: Does not include foreign exchange losses

From the above, no particular problem has been identified regarding the financial aspect of operation and maintenance.

<Current Status of Operation and Maintenance>

According to Thac Mo JSC, the facilities and equipment of the hydropower station extended by the project are well maintained and operating smoothly, including the main equipment such as turbines, generators, gas breakers, and medium pressure switchgears. In addition, maintenance records are prepared for each activity, and the results of the activities are compiled and reported to the EVN every month. Whenever a problem occurs, it is to be reported to the EVN. Although there was an initial problem with the turbine water seal system and the filter of the water cooling system in 2018, necessary measures have taken place by Thac Mo JSC and there have been no sudden problems since.

Spare parts are procured by Thac Mo JSC based on the electrical equipment contract with the vendor and are stored in the equipment warehouse of Thac Mo JSC. In addition, database has been established and acceptance record has been maintained to manage spare parts. Although there is no need to procure them at this time, since some transformers, circuit breakers, etc. need to be imported, Thac Mo JSC is systematically managing them so that they can be procured in a timely manner when needed.

From the above, no particular problem has been identified regarding the operation and maintenance status.

<Evaluation Result>
Therefore, the sustainability of the project effect is high.

III. Recommendations & Lessons Learned

Recommendations to Executing Agency: None

Recommendations to JICA: None

Lessons Learned for Executing Agency and JICA: One of the main reasons for the delay of the project was due to the significant delay in the contractor selection process, while another reason was the delay in starting the selection of consultants. Pre-construction work such as land acquisition and removal of power lines, which was to be carried out by the Vietnamese side, was delayed more than expected, and the schedule was changed to avoid the start of construction in the rainy season, so the overall project process was delayed. As a result, the executing agency no longer needed to conclude contract with consultants early after the start of the project, which it aimed for. As a result, the executing agency changed the selection method of contractors from direct contract method to competitive bidding method, which resulted in delay in the start of consultant selection. Therefore, in order to start the project without delay after concluding the loan agreement, the executing agency should plan well in advance to prepare and coordinate with related parties regarding responsibilities which are the prerequisites to the project.

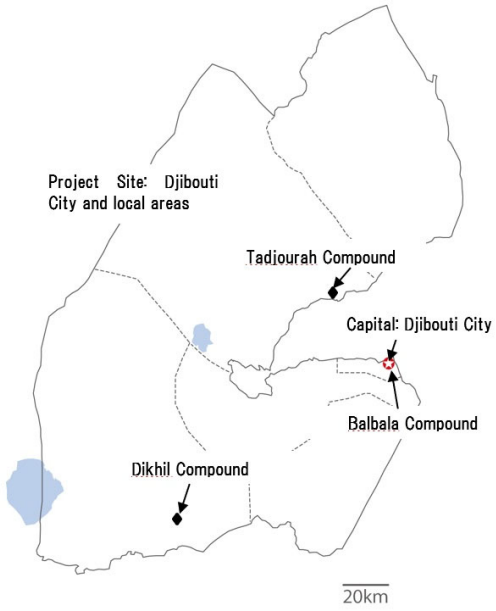
Control Room

Machine Room

FY2020 Simplified Ex-Post Evaluation Report of Japanese Grant Aid Project

External Evaluator: Kenichi Inazawa, Octavia Japan, Co., Ltd. (March 2021)
Duration of the Study: November 2020－November, 2021
Duration of the Field Study: January 4－16, 2021

Country Name	**The Project for the Improvement of Road Management Equipment in the Republic of Djibouti**
The Republic of Djibouti	



Location of the Project Sites

Procured Road Maintenance Equipment (Bulldozer)

I. Project Outline

Background	Prior to the start of this project, high economic growth was observed in neighboring Ethiopia, with Djibouti functioning as an outer port; several large-scale infrastructures were constructed in Djibouti, including a new port and railways. Conversely, land transportation depended entirely on the road network. The surfaces of the trunk roads deteriorated as the volume of traffic rapidly increased. In addition, even in the capital city, road conditions were deteriorating because they were not being adequately maintained, due to a lack of road maintenance equipment for small-scale construction. Buses did not operate regularly and there was dust everywhere. These issues greatly affected the lives of citizens. The Road Bureau, under the Ministry for Equipment and Transport (Agence Djiboutienne des Routes, Ministre de l'equipment et des Transport; hereinafter referred to as “ADR”), the executing agency of this project, was the owner of the outdated road management equipment which was no longer fit for purpose. Due to budget shortages, the ADR was unable to replace the old equipment and could not respond to the diversifying needs of road management. Under such circumstances, the government of Djibouti requested that Japan provide assistance in the form of a grant aid to help improve the road maintenance equipment.
Objective of the Project	The objective of this project was to improve the ADR’s road maintenance system and capacity, by introducing road development and maintenance equipment at three maintenance bases (Djibouti City, Dikhil City and Tadjourah City), thereby contributing to the development of socio-economic infrastructures, leading to the sustainable development of Djibouti.
Project Outputs	1. Project Sites: Djibouti City, Dikhil City, Tadjourah City 2. Japanese Side: 1) Procurement of equipment Road maintenance equipment: bulldozers, motor graders, dump trucks, tank trucks, mobile workshops, asphalt plants, spare parts, etc. Workshop equipment: generators, air compressors, mechanic tool sets, etc. 2) Consulting services/Soft component Consulting services: detailed design, procurement supervision Soft component: improvement of equipment management system, training on equipment inspection/maintenance capacity enhancement, technical guidance through pilot construction, guidance on reinforced maintenance system 3. Djiboutian Side: -securing of handover area for the new equipment provided (preparing workshop facilities).

	-securing of storage space for spare parts. -timely commencement of construction on priority roads following the procurement of equipment. -domestic transportation of the equipment to the construction sites for the aforementioned road development. -placement of necessary technicians and operators to undertake the aforementioned road development. -securing of land required for the aforementioned road development. -appropriate operation and maintenance of the equipment procured by this project and placement of technicians, required for such operations and maintenance work. -appropriate operation and maintenance, as well as continuous utilization of the appliances, procured through this project's soft component, such as PCs and the equipment management systems, established as a result of this project. -road development planning with due consideration for pedestrians, such as children walking to/from school. -sufficient briefing of residents on road construction schedules, with advice on safety when road construction is underway.			
Implementation Schedule	E/N Date	March 28, 2016	Disbursement Date	-
	G/A Date	May 15, 2016	Completion Date	June 14, 2019
Project Cost	G/A Grant Limit: 1,239 million yen		Actual Grant Amount: 1,206 million yen	
Executing Agency	Agence Djiboutienne des Routes, Ministre de l'equipment et des Transport (ADR)			
Conditions	N/A			
Borrower	N/A			
Contracted Agencies	Main Contractor: ITOCHU Corporation Main Consultant: Yachiyo Engineering Co., Ltd. Procurement Agency: N/A			

II. Result of the Evaluation

Summary

This project aimed at improving the road maintenance system and capacity, by introducing road development and maintenance equipment and by providing soft component training at three maintenance bases in Djibouti City and rural areas (Dikhil City and Tadjourah City). When the project was planned, the government of Djibouti aimed to develop and maintain national and city roads in a strategic manner based on its long-term plan, *Vision Djibouti 2035*, and the mid-term plan, *Strategy of Accelerated Growth and Promotion of Employment* (SCAPE) (2015-2019). In addition, a rapid increase in the volume of traffic resulted in the deterioration of the trunk roads, as maintenance was insufficient due to a lack of road maintenance equipment for small-scale construction. The condition of the roads in the city deteriorated. Buses did not operate regularly and there was a lot of dust. The situation was negatively affecting the lives of the citizens. In addition, the road maintenance equipment, owned by Agence Djiboutienne des Routes, Ministre de l'equipment et des Transport (hereinafter referred to as "ADR"), the executing agency of this project, was outdated and was no longer fit for purpose. The ADR could not update the equipment due to budget shortages. Considering that there was a significant need to improve road conditions through equipment introduction, the project's relevance is high. As for efficiency, while the project outputs and costs were generally within the plan, in terms of the project period, the installation, startup and initial operation of the asphalt plant, one of the main outputs of this project, took longer than initially expected. Therefore, efficiency is fair. Regarding effectiveness, three quantitative effect indicators were set at the time of planning: (1) distance of developed road (new pavement), (2) distance of developed road (rectification of road), (3) average vehicle speed during non-congested periods. At the time of the ex-post evaluation, (1) and (3) had primarily been achieved. (2) had not been achieved, due to the ADR's prolonged internal human resource procedures and delays in relation to the asphalt production systems. On the other hand, the qualitative interview survey confirmed that convenience and road safety had improved, with fewer issues relating to dust on the main roads in Djibouti City and in rural areas. Therefore, the effectiveness and impacts of the project are fair. With respect to sustainability, there is no specific concern in relation to the institutional, technical or financial aspects of the ADR. No problems have been observed in terms of the operation and maintenance of the procured road maintenance equipment. Hence, the sustainability of the project effects is regarded as high.

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

Overall Rating[1]	B	Relevance	③[2]	Effectiveness and Impacts	②	Efficiency	②	Sustainability	③

<Special Perspectives Considered in the Ex-Post Evaluation/Constraints of the Ex-Post Evaluation>

Due to the COVID-19 pandemic, an external evaluator did not travel internationally for this study. Instead, field surveys were conducted remotely, utilizing local assistants who conducted site inspections, collected information and data, and interviewed the relevant individuals. The external evaluator examined the obtained information, based on which the evaluation and analysis were made.

1. Relevance

<Consistency with the Development Plan of Djibouti at the Time of the Ex-Ante Evaluation>

The government of Djibouti advocated the need for strategic development and maintenance of national and city roads in its long-term development plan, *Vision Djibouti 2035* and the mid-term plan, *SCAPE 2015 −2019*. *Vision Djibouti 2035*, in particular, developed a priority action plan for the ministry's road traffic field and reorganized/strengthened the related departments within the ministry, as a result of which the ADR was established in November 2013. The establishment of the ADR aimed to reinforce the system used by the government to directly manage the trunk roads and roads in rural areas, as well as in Djibouti City.

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

[2] ③: High, ②: Fair, ①: Low

<Consistency with the Development Needs of Djibouti at the Time of the Ex-Ante Evaluation>

Prior to the start of this project, land transportation was completely dependent on the road network. The conditions of the trunk roads deteriorated as the volume of traffic increased rapidly. In addition, even in the capital, Djibouti City, the roads were not well maintained due to the shortage of road maintenance equipment for small-scale construction. As a result, the road conditions worsened in the city, with fewer regular bus services and more reported issues of dust, adversely affecting the lives of citizens. Under such circumstances, the road maintenance equipment, owned by the ADR, was outdated and no longer fit for purpose. The ADR could not update the equipment due to budget shortages and were, therefore, incapable of responding to the road management needs.

<Consistency with Japan's ODA Policy at the Time of the Ex-Ante Evaluation>

"Building socio-economic infrastructures for sustainable development" was stipulated as one of the priority areas in the Japanese government's *Country Assistance Policy for the Republic of Djibouti* (April 2014). In addition, Djibouti acted as a logistics center in East Africa and was actively involved in addressing international issues, including piracy. Assistance for Djibouti through Japan's ODA was expected to help the country tackle its national challenges, and promote stability and development. It was also expected to contribute to the stable development of the East African and global economy as a whole. Considering the above, this project was intended to contribute to the socio-economic infrastructures of Djibouti, and therefore, was in line with Japan's ODA policy.

<Evaluation Result>

In light of the above, the relevance of this project is high.

2. Effectiveness/Impacts

<Effectiveness>

<Quantitative Effects>

This project set out planned construction work on priority roads requiring maintenance, by introducing road maintenance equipment. Three indicators were established at the planning stage to measure the effects of this project: (1) distance of developed road (new pavement); (2) distance of developed road (rectification of road) and (3) average vehicle speed during non-congested periods. The quantitative effect indicators (baseline, target, actual) are shown in Table 1. In addition, the targeted roads and their locations are shown in Figure 1 which is found at the end of this report.

(1) Distance of developed road (new pavement): the target was exceeded for the roads within Djibouti City. According to the ADR, road development has advanced since the time baseline was set (2014－15) and especially in recent years, as the central government has been focusing on road development and improvement; the flow of traffic has also improved, despite the fact that the volume of traffic has increased in many areas of the city. It was also stated that the road maintenance equipment, introduced by this project, was highly utilized. On the other hand, the actual extension of the RN12 (RN9 junction – Day: a mountainous road, heading in a northerly direction from the RN9 to Day, located in Tadjourah City) was 12 km shorter than the target. This was due to the revision of the initial plan resulting in a route change. The area was prone to flooding and road construction was considered difficult in close proximity to a wadi[3]. Therefore, the initial extension plan of 40 km was amended to 12 km. By the time of the ex-post evaluation, all 12km of pavement has been completed. In other words, the road development was completed as planned after the initial plan was changed.

(2) Distance of developed road (rectification of road): at the time of the ex-post evaluation (February 2021) no construction work had been carried out. According to ADR, it is because the Government of Djibouti has indicated a plan of prioritizing road development and improvement in Djibouti City and the development priority of RN 16 has been lowered, considering the flood damage occurred in 2019. Meanwhile, the ADR concedes that the road surfaces of the RN16 are not in a good condition, and intends to plan for road development in the future[4].

According to the ADR, the road maintenance equipment, procured by this project, is also being utilized to repair roads in addition to the targeted sections, shown in Table 1[5]. The procured equipment is deemed to be utilized in Djibouti City, Dikhil City and Tadjourah City, where maintenance bases are located and will eventually be used in other areas in the future.

(3) Average vehicle speed during non-congested periods: with the exception of the section along the RN16, the targets have generally been achieved. According to the ADR, one of the main reasons was that the procured equipment was utilized to repair road surfaces and to pave roads[6]. In the paved section along the RN12 (updated plan: 12 km) the speed of 40 km/h was achieved in general. The ADR also states that the installation of pavements and road improvement works have also progressed in other sections, resulting in improved vehicle speeds. On the other hand, the average speed of the section along the RN16 has not reached the set target, as no evidence of progress in road development was noted at the time of the ex-post evaluation as discussed above.

[3] It refers to a dry river with no running water in desert climate and arid areas. A seasonal river.

[4] The construction supervision consultant made a recommendation at the time of the defect inspection (June 2019) that the ADR should invest financial and human resources into promoting the road development budget and personnel, for which the ADR is responsible.

[5] It is believed that the repairs are primarily being carried out in the capital, Djibouti City, using the equipment.

[6] The local consultant tested the speed personally, the result of which was no different from the data provided by the ADR.

Table 1: Quantitative Effect Indicators of this Project (Baseline, Target, Actual)

Indicators	Baseline 2015 Baseline Year	Target 2021 3 Years After Completion	Actual 2019	Actual 2020	Actual 2021 3 Years After Completion
(1) Distance of developed road (new pavement) (Djibouti City roads, RN12)	0 (Djibouti City roads)	1.4 km (Djibouti City roads)	N/A	1.3 km	5.6 km
	0 (RN12)	21 km (RN12)	N/A	N/A	12 km *Note
(2) Distance of developed road (rectification of road) (RN16)	0 (RN16 (Junction of RN14 and Gorriliyita))	40 km (RN16 (Junction of RN14 and Gorriliyita))	N/A	N/A	0 km
(3) Average vehicle speed during non-congested periods	45 km/h (RN1 Dikhil－Galafi)	60 km/h (RN1 Dikhil－Galafi)	45 km/h	45 km/h	60 km/h
	40 km/h (RN9 (Junction with RN1, PK51－Tadjourah))	60 km/h (RN9 (Junction with RN1, PK51－Tadjourah))	40 km/h	40 km/h	50 km/h
	25 km/h (RN12)	40 km/h (RN12)	25 km/h	25 km/h	40 km/h
	30 km/h (RN16 (Junction with RN14－Gorriliyita))	50 km/h (RN16 (Junction with RN14－Gorriliyita))	30 km/h	30 km/h	30 km/h
	15 km/h (Djibouti City road)	30 km/h (Djibouti City road)	15 km/h	50 km/h	50 km/h

Source: JICA document (baseline, target), answers to the questionnaire and ADR interviews (actual)
Note: the initial plan was revised and the route was changed. As a result, the extension became shorter than initially anticipated (the initial plan was 40 km, which was reduced to 12 km following the change of plan. At the time of the ex-post evaluation, all 12km of pavement has been paved).

<Qualitative Effects>

In this study, the ADR's management and its maintenance base staff were interviewed regarding the improvements in terms of convenience and driving safety, as well as the status of the operation of public transport (buses). The following comments were received: "Before the road maintenance equipment was procured (prior to the start of this project), the roads in Djibouti City, as well as in rural areas, had many potholes[7]. At present, the road development and repairs are progressing. Drivers must be benefiting from the comfortable road surface." "Public transport vehicles (buses) used to take other routes, due to the damaged road surfaces, which affected smooth travel. As a result of the introduction of the road maintenance equipment and the road surface repairs, buses are using the original routes." "The users of public transport (buses) are increasing. As potholes and damage have been repaired, the number of passengers during the day is on the rise." "On the other hand, some roads are still unpaved or have potholes and noticeable damage." With respect to reduced levels of dust, the following comments were received: "with more asphalt paved sections, dust has been reduced." "Residents along the roads seem to be becoming more aware of the environment because there is less dust." "As the road maintenance equipment was introduced and the number of paved sections has increased, we have noticed a positive impact on the roads after flooding, that is, water disperses fairly quickly. I think the improved roads contribute to the reduction of flood damage." Considering the aforementioned comments, it can be said that the implementation of this project has improved convenience and driving safety on the major trunk roads in Djibouti and the surrounding rural areas; dust is also decreasing, due to the progress being made in terms of road paving (asphaltization).

<Impacts>

(1) Contribution to Socio-Economic Infrastructure Development for Sustainable Development

Table 2 shows Djibouti's GDP growth rates; Table 3 shows the handling volume of dry cargo (general cargo) and Table 4 shows the changes in the number of disembarking passengers, between the start of this project and the ex-post evaluation.

(Reference) Table 2: Djibouti's GDP Growth Rates

(Unit: %)

2016	2017	2018	2019
6.9%	5.1%	8.5%	7.5%

Source: International Monetary Fund (IMF)

(Reference) Table 3: Handling Volume of Dry Cargo (General Cargo)
(The upper raw represents imports, while the lower raw represents exports)

(Unit: thousand ton)

2016	2017	2018	2019
11,668	9,554	10,012	9,809
2,248	2,168	1,989	2,085

Source: Directorate of Economy and Planning (Direction de l'Economie et du Plan), MEFI

[7] A phenomenon that causes the pavement surface to deteriorate, due to cracks on the road surface, resulting in holes appearing.

(Reference) Table 4: Changes in the Number of Disembarking Passengers
(Tourism Sector Indicator)

(Unit: person)

2016	2017	2018	2019
126,179	132,829	141,941	167,474

Source: Department of Statistics: DMT-DCT-PDSA

Djibouti plays a key role in the maritime trade of Ethiopia, a landlocked country. Ethiopia, followed by France, accounts for a large proportion of Djibouti's trade. While Table 3 shows that the handling volume of dry cargo (exports) has not increased dramatically, Table 2 indicates that GDP growth has been stable at around 5－8% in recent years. In addition, Table 4 shows that the number of Djibouti Port's disembarking passengers has been increasing. The ADR's management was interviewed in relation to the aforementioned situations, namely the way in which they are related to this project and the circumstances surrounding the road sector; a representative commented: "in 2016－2017 when this project began, approximately 62% of Djibouti's main roads (totally 148 km) were not developed and needed improvement. As a result of the road maintenance equipment of this project becoming available, the proportion of undeveloped/unimproved roads has been reduced to approximately 50%. Through continued utilization of the road maintenance equipment and the government's continued support for the road sector with specific budgets, the proportion of the undeveloped/unimproved roads could be further reduced to approximately 24%. Progress in road maintenance will support various economic activities." Since such statistical data are also influenced by factors other than this project, it is not possible to clearly establish the economic and social impact of this project. Nevertheless, considering the comment received in the interview survey, it can be said that this project has contributed to the smoothness of Djibouti's transport network, making it efficient in terms of logistics and supporting urban development, as well as economic and social progress.

(2) Other Positive and Negative Impacts
1) Impact on the Natural Environment
The questionnaire and interviews confirmed that the procured road maintenance equipment has specifications suitable for the natural environment of the construction sites, such as climatic conditions, and that the project does not have a negative impact on the environment. It was also confirmed by means of the questionnaire and interviews that there was no negative impact on the natural environment, including air pollution, noise/vibration and the ecosystem during the project or after the project's completion, in the areas surrounding the roads on which the road maintenance equipment, procured by this project, was used.

2) Impact on the Social Environment (Land Acquisition and Resettlement)
This project mainly concerned procuring road maintenance equipment. Land acquisition was not necessary as the project involved the improvement of existing roads. In addition, the road development did not require any residents or households to resettle.

3) Impact on Gender
In this study no particular impact on gender was observed as a result of the questionnaire, interview survey or the site visits conducted by the local consultant.

4) Other Impacts
In this study no other impacts were observed as a result of the questionnaire, interview survey or the site visits conducted by the local consultant.

<Evaluation Result>
The following three quantitative effect indicators were set for this project at the planning stage: (1) distance of developed road (new pavement); (2) distance of developed road (rectification of road) and (3) average vehicle speed during non-congested periods. (1) and (3) had primarily been achieved at the time of the ex-post evaluation. Due to the ADR's internal personnel reshuffles and delays in establishing an asphalt production system, (2) had not been achieved. On the other hand, the qualitative interview survey confirmed that comfort and safety levels had improved along the main roads in Djibouti City, as well as in rural areas, with fewer issues relating to dust. Therefore, this project has achieved its objectives to some extent, and the effectiveness and impacts of the project are regarded as fair.

3. Efficiency

<Outputs>
The project outputs on the part of the Japanese and Djiboutian counterparts, outlined in the "I. Project Outline," were implemented as planned.

<Inputs>
The planned project period was from April 2016 to February 2017 (21 months). In reality, the project lasted from April 2016 to May 2018 (26 months), which was slightly longer than planned (approximately 124% of the plan). The main reason was that the on-site installation of the asphalt plant, which was one of the project outputs, required more time than expected, as did the startup and initial operation. Consequently, the schedule of the training which was a part of the soft component (support function for the operation and maintenance utilizing the plant) was affected, delaying the project schedule.
The planned total cost of this project was approximately 1,250 million yen (of which 1,239 million yen was to be financed by an ODA loan and approximately 11 million yen was to be financed by Djibouti). In reality, the total cost was approximately 1,216 million yen (of which 1,206 million yen was financed by an ODA loan and approximately 10 million yen by Djibouti), which was generally as planned (approximately 97% of the plan).

Although the project cost was mostly within the plan, the project period slightly exceeded the plan. Therefore, efficiency of the project is

fair.

4. Sustainability

<Institutional/Organizational Aspect>

At the time of the ex-post evaluation (as of February 2021), the executing agency of this project was the ADR. The ADR's Balbala maintenance base, located in Djibouti City, manages all road and maintenance equipment. The Balbala maintenance base carries out the road maintenance works by collaborating with the Dikhil and Tadjourah maintenance bases in rural areas. The Balbala maintenance base has 35 staff members, while the Dikhil and Tadjourah maintenance bases have 15 and two staff members, respectively. According to the questionnaire and the ADR interviews, all bases have a sufficient number of staff and there are no particular concerns in relation to staff shortages which could potentially affect the work.

<Technical Aspect>

While many of the ADR staff members do not have technical qualifications, they are very experienced in maintenance and equipment operations. It was confirmed as a result of the questionnaire, site visits by the local consultant and staff interviews that there was no shortage in terms of technical expertise. Although the ADR does not provide any training courses for its new recruits, many of those hired are graduates of technical colleges, and the ADR strives to recruit personnel who are above average in terms of capability. After joining the agency, the new staff strive to improve their abilities and knowledge through their work experiences.

To ensure that the technical levels from an operation and maintenance perspective are being maintained, the ADR conducts regular training sessions for its staff. The ADR's Equipment Maintenance Management and Storage Department offers training courses, such as "Equipment Maintenance" and "Emergency Responses." In addition, an equipment ledger management database (general-purpose software) was provided by the training program within this project (soft component), which enabled easy understanding of the warehousing status of the ADR's road maintenance equipment and spare parts, including those introduced by the project. According to the ADR, this database has enabled them to efficiently capture and manage the equipment maintenance cycles and timings of spare parts' procurement. In addition, during the project implementation, the Japanese consultant provided the ADR with a manual for the operation and maintenance of the construction equipment, as well as an operation record manual. The ADR's maintenance bases refer to these maintenance manuals as required, when carrying out their duties.

<Financial Aspect>

Table 5 shows the annual maintenance costs (most recent three years) for the road maintenance equipment owned by the ADR (including those procured by this project). According to the ADR's Finance Department, the number of road maintenance projects is increasing in Djibouti City and its suburban areas, and the quantity of road maintenance equipment used is also increasing, which explains the higher costs. These costs form part of the ADR's own budget, which is mainly funded by the government. According to the ADR, the necessary budget is allocated without excess or deficiency.

Table 5: Maintenance Cost for ADR's Road Maintenance Equipment

(Unit: Djiboutian franc)

2018	2019	2020
13,901,270	17,643,480	24,548,820

Source: ADR

Note: it was difficult to calculate or obtain information on the specific costs relating to the road maintenance equipment, procured by this project.

<Current Status of Operation and Maintenance>

The questionnaire and interviews confirmed that there were no major concerns regarding the maintenance status of the procured equipment and no anticipated problems. There was no damage deemed substantial enough to affect the road surfaces that had been improved using the road maintenance equipment. The status of the operation and maintenance of the developed sections was generally good.

The spare parts of the road maintenance equipment are stored in the ADR's own storage facilities. The spare parts are recorded and managed by the equipment ledger management database provided in this project, whereby storage facility managers provide the required parts as soon as they are requested by the local sites or the equipment managers. The ADR's interviews confirmed that there was no problem with the storage status or the quantities of spare parts at the time of the ex-post evaluation. Spare parts are primarily purchased from Europe and Asia. However, there are some concerns regarding the future. For example, the spare parts of the maintenance vehicle safety devices (crash pad discs, crash assemblies, etc.) and brake valves need to be purchased directly from Japan, and it takes at least one month from the point of order to delivery. The ADR pointed out that should a parts replacement be delayed, it could affect the progress of the road construction projects, the number of which is increasing throughout Djibouti. While the mandate of a grant aid project does not often extend to establishing a robust spare parts procurement system, it will be necessary to face the issue of establishing a timely and efficient procurement system, should the volume of road maintenance be expected to increase in the future.

<Evaluation Result>

Therefore, the sustainability of the project effect is high.

III. Recommendations and Lessons Learned

Recommendations to Executing Agency: Should the need for road development and repairs be expected to increase in the future in Djibouti City and in rural areas, it is recommended that the ADR operate and inspect the road maintenance equipment thoroughly, manage the procurement of spare parts, including inventory controls, and continue to ensure prompt and high-quality operation and maintenance works.

Recommendations to JICA: None

Lessons Learned: While the ADR has been securing the spare parts necessary for its road maintenance works at the time of the ex-post evaluation, the procurement system is not necessarily well established for the future, considering the increasing number of road constructions throughout Djibouti. In particular, due consideration must be given to spare parts that require a lead time from the point of order to delivery. While a grant aid project's mandate does not often extend to establishing an efficient system for spare parts' procurement, it is desirable that JICA and its partner country's government should enter into discussions from the initial planning stage, so that a delivery date and stock level of each spare part is always accessible and a prompt and efficient procurement system established, should there be an increasing need for road development and repairs in the future. The issue may not be limited to this project. As similar situations could arise in other grant aid projects, it is always important to consider working on establishing a spare parts' procurement system at the formation of the project where possible.

Photo 1: Procured Road Maintenance Equipment (Road Roller)

Photo 2: Road in Djibouti City, Developed by Utilization of the Road Maintenance Equipment

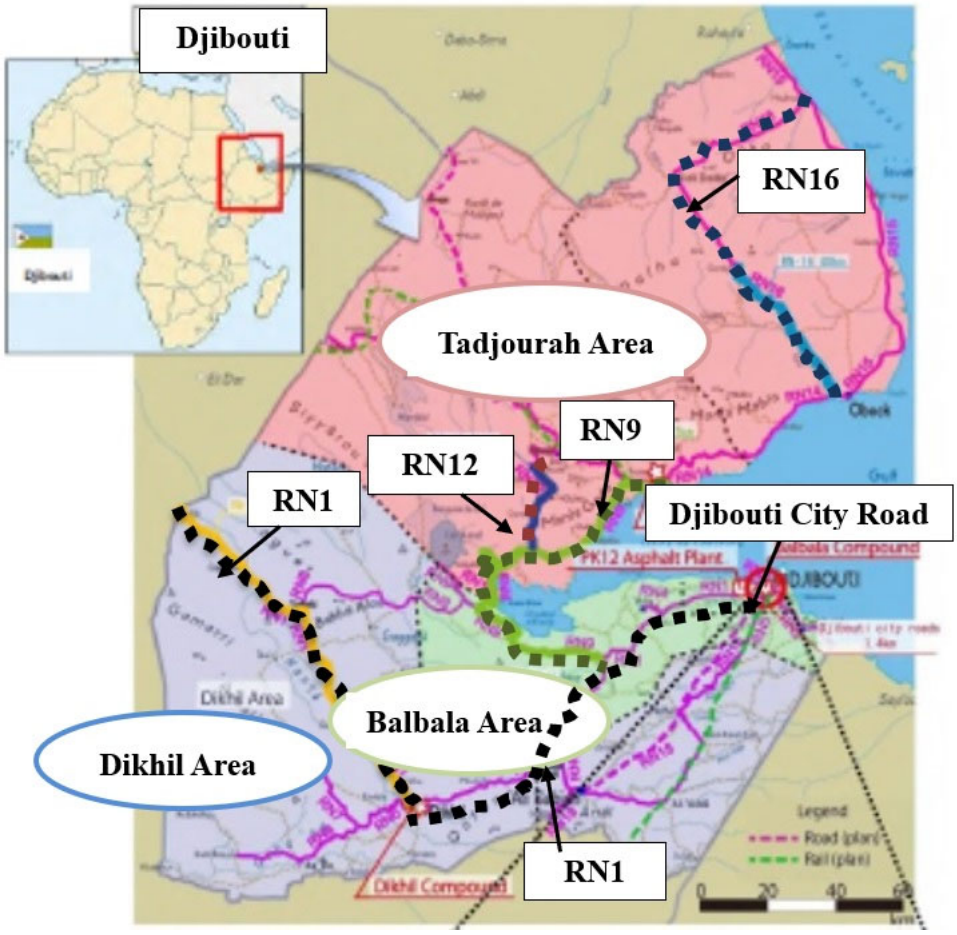


Figure 1: Roads Covered by this Project (dotted lines are the targeted sections)
(Source: prepared by the evaluator, based on the figure from JICA document (preparatory survey report))